The Perception of Psychology as Unscientific:
The cognitive mechanisms underlying the perception that psychology is not a science

by
Lindsay Morgan
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Abstract

While psychology can be straightforwardly shown to be a science, many do not perceive it to be a scientific discipline. Although researchers have examined this phenomenon (e.g., Lilienfeld, 2011), they have yet to empirically identify the cognitive mechanisms that might be responsible for it. One possibility is that a dual-process account of cognition might explain the phenomenon; that is, while individuals may understand that psychology is a science, they may not implicitly associate psychology with science. The goal of this thesis is to explore this possibility. The participants completed a discrete free association task (Nelson et al., 2004) for academic disciplines that included the natural sciences and psychology. The results demonstrated that psychology was found to be conceptually different from science and the natural sciences. Moreover, the results suggest that science might be conceived of as the topics and objects of study rather than its methodologies. In addition, participants rated each discipline on a number of dimensions (e.g., difficulty, importance, and concreteness). The results demonstrated that, while psychology scored above the mean on the rating of scientific, the discipline scored below the mean on dimensions that significantly predicted the dimension scientific: difficulty and concreteness. Based on the results, suggestions are provided to assist in improving the perception of psychology as genuinely scientific.

Keywords: perception, science, psychology, cognitive mechanisms

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Introduction

The public's unfavorable perception of psychology is hardly a new issue. Members of the American Psychological Association have expressed concerns about psychology's public image since its first organizational meeting in 1892 (Benjamin, 1986). While popular psychological phenomena seem to fascinate the general public (Weisberg, Keil, Goodstein, Rawson, & Gray, 2008), there is abundant evidence that psychology is not taken seriously as a science (Janda, England, Lovejoy & Drury, 1998; Lilienfeld, 2011; Stanovich, 2013; Zimbardo, 2004). For example, Janda et al. (1998) found that participants expressed the belief that psychology had made a less important contribution to society than other scientific disciplines. Weisberg et al. (2008) discovered that explanations of psychological phenomena are more satisfying when they are associated with neuroscientific terminology. Similarly, McCabe and Castel (2008) found that participants rated articles about psychology to be more scientific when they included images of the brain. Anecdotally, a Los Angeles Times journalist, Alex B. Berezow (2012), argued that psychology is not a science because it does not meet the necessary criteria to identify a field as scientifically rigorous: clearly defined terminology, quantifiability, highly controlled experimental conditions, reproducibility and, finally, predictability and testability. Using happiness research as an example, Berezow contended that arbitrary scales cannot yield measurable results. He concluded that if psychology is to be considered a legitimate science, the term science would no longer refer to the empirical analysis of the natural world, but rather "any topic that sprinkles a few numbers around". Yet, any introductory research methods for psychology text book could be used to demonstrate that Berezow was undoubtedly misinformed (e.g., Gravetter & Forzano, 2012; Rosenthal & Rosnow, 2008; Shaughnessy, Zechmeister, & Zechmeister, 2000). Establishing any discipline as a science is a difficult task (Chalmers, 2013). Nonetheless, psychology as a discipline and field of research can be straightforwardly demonstrated to be a science. Yet, psychology is still not perceived to be a scientific discipline in the eyes of the general public.

Many researchers have attempted to understand this phenomenon (e.g., Lilienfeld, 2011; Stanovich, 2013). However, research has thus far primarily focused on providing empirical evidence that there is a misperception of psychology within the scientific community. Consequently, there appears to be a lack of research examining the cognitive mechanisms that might underlie the issue. I would argue that a dual-processing account of cognition can be used to explain such cognitive mechanisms. It puts forth that human reasoning comprises two thought processes that are controlled by differential operations (Kahneman, 2011; Stanovich, 2004). System 1 is an implicit system with low capacity requirements. It operates automatically and unconsciously. System 2 is a rule-based system with high capacity requirements. It operates in a controlled and conscious manner. Thus, individuals might have an explicit understanding that psychology is a science without implicitly associating it with science in semantic memory. For instance, people might associate sciences with their objects of study rather than their methodology.

In support of this possibility, Krull and Silvera (2013) found that participants rated equipment from the natural sciences (e.g., microscopes) to be more scientific than equipment from the behavioral sciences (e.g., questionnaires). Using a free association paradigm, Morgan

(2015) found that the terms *science* and *psychology* shared semantic associates that exemplify scientific methodology. Yet, participants did not think of science when prompted with psychology, nor did they think of psychology when prompted with science. These results suggest that some individuals might be aware that psychology is scientific, but fail to label it a science because it studies the “wrong” type of content. This misconception of science may lead to the semantic dissociation between the concepts of science and psychology.

Accordingly, the goal of this thesis will be to empirically examine the cognitive mechanisms that underlie the misperception of psychology as nonscientific. More specifically, I will use the free association paradigm (Nelson, McEvoy, & Schreiber, 2004) to investigate the semantic associative network that incorporates these academic disciplines. Furthermore, I will investigate the differences in individuals’ semantic associative networks dependent upon their level of scientific literacy and their level of education in psychology. If the misperception of psychology as unscientific can be explained by dual-processing accounts of cognition, the terms evoked for the cue *psychology* will be different than those evoked for the cues *science*, *chemistry*, *biology*, and *physics*. These results would suggest that implicitly, psychology is perceived as different from science and the natural sciences. Concurrently, I will also measure participants’ explicit perceptions of psychology. They will be asked to rate the academic disciplines on how scientific they believe them to be. If participants demonstrate an understanding that psychology is, in fact, scientific, this will provide more evidence for the dual-process accounts of cognition hypothesis. Moreover, while the explicit results may differ depending on participants’ scientific literacy and their level of education in psychology, the implicit results should not differ between these populations.

To achieve these goals, I will first establish that psychology is a science. Next, I will present that, while psychology can be straightforwardly demonstrated to adhere to the rigor of science, it is not perceived to be scientific. I will then review the literature that explains why psychology is not perceived to be scientific. Finally, I will argue that a dual-processing account of cognition can be used to explain the misperception of psychology as unscientific.

Scientific Psychology

Psychology focuses on human behavior. However, to say that this is what distinguishes psychology from other disciplines would be false, as a variety of academic pursuits also focus on human behavior (e.g., economics, law, and history) (Stanovich, 2013). Psychology may be distinguished from these other areas of inquiry because it seeks to understand behavior by empirically testing its theories. In other words, psychologists' epistemological dispositions lead them to answer their research questions using discipline appropriate experiments like the other scientific disciplines do. A comprehensive explanation of what makes a given discipline a science is beyond the scope of this thesis (see Chalmers, 2013, for an excellent discussion), but several key characteristics are generally agreed upon. For instance, science journalist Alex B. Berezow (2012) reasonably argued that any given discipline must possess five key characteristics to be considered genuinely scientific: predictability and testability, highly controlled experimental conditions, clearly defined terminology, quantifiability, and reproducibility. Unfortunately, he argued that psychology should not be considered a science because he thought that it failed to meet these five criteria. However, it can be demonstrated that psychology does in fact meet them (Stanovich, 2013).

Predictability and testability. Psychological research examines research questions that possess a scientific means for achieving an answer. Much like other sciences, psychology researchers use hypotheses to generate testable predictions. Thus, psychology has provided a means to predict and test human behavior using methodologies similar to other scientific fields of study.

Highly controlled experimental conditions. Some behavioral research uses non-experimental methods such as observation and case studies, where causal inferences are not to be drawn. However, psychology experiments allow researchers to accurately determine the causal relationships that exist among variables by holding all other variables constant.

Clearly defined terminology. Variables, especially those difficult to measure directly are defined beforehand by establishing a clear relationship between theoretical constructs and their empirical basis in observable operations. This process of defining variables via operationalization (Campbell, 1920) is at the core of experimental research in psychology.

Quantifiability. Similarly to other sciences, operationalizing variables allows researchers to quantify constructs via external behaviors. Four main scales of measurement are used to quantify observations: nominal, ordinal, interval, and ratio (Stevens, 1946). This method of quantifying observed behavior allows for comparison much like other sciences.

Reproducibility. Psychology research is made public via peer-reviewed journal articles. In doing so, researchers are able to reproduce experimental methodology in order to verify observations through the process of replication (see Klein et al., 2014 for an investigation of the variation in replicability of psychological effects).

Hence, Berezow's five key criteria, necessary to maintain that a discipline is, in fact, scientific, have been met by psychology at least as well as other scientific fields of study. Understanding that psychology is a science impacts students, the general population, and everyone's consumption of research. Understanding the importance of scientific psychology has similar implications.

The Importance of Scientific Psychology

Undoubtedly, science is important and its methods have been widely argued to be the best strategy for gaining knowledge about the way the world works (Coyne, 2015; Levitin, 2017). Therefore, it is not surprising that it tends to be viewed favorably among the public. Additionally, the public's favorable acceptance of science is important if its findings are to be used to advance public policy (Durant, Evans, & Thomas, 1989). Whether one considers climate change, epidemiology, or the space program, it is undeniable that science shapes society. Nonetheless, the findings from the natural sciences and psychology are equally important.

Since Fechner first proposed applying the scientific method to the study of mind and behavior in 1850 (Marshall, 1990), psychological research has had a positive impact on society (Miller, 1969). For instance, Serpell (1984) commented on how psychology had positively impacted third world countries through sociocultural development. More recently, Ryback (2011) noted that Carl Rogers' humanistic psychology impacted international relations by helping bring forward a more fruitful approach to conflict resolution. Psychology has not only generated therapies to treat mental problems, but it has also allowed for the systematic assessment of a variety of aptitudes and behaviors (e.g., intelligence testing, personality, and vocational interests). Furthermore, psychology has impacted society through its contributions to a wide array of topics that includes self-directed change, development across the lifespan, parenting, stress, unconscious motivation, prejudice and discrimination, political polling, criminal justice, education, health, and perception. To list all of the societal contributions that psychology has made is beyond the scope of this thesis, but it is easy to illustrate that they have been widespread and consequential (see Phillips, 2000 for an excellent review on psychology's impact on social policy).

Unfortunately, however, research has demonstrated that the public does not fully understand the importance of these contributions (Janda et al., 1998; Krull & Silvera 2013; Zimbardo, 2004). Lilienfeld (2011) argued that the troubling phenomenon is met when psychologists enter the "real world". Some evidence suggests, however, that psychology's image problem is not limited to the lay public. Even some psychologists have questioned its legitimacy. For instance, Rogers (1995) argued that psychology should be viewed as a narrative craft rather than a science. Moreover, in an attempt to examine the perception of psychology as a science relative to other disciplines, Janda et al. (1998) surveyed both the general population and college faculty. They hypothesized that psychology would be perceived more favorably by college faculty than the general public. Participants rated the importance of numerous academic disciplines and listed the most important contributions that each discipline had made toward society. The results demonstrated that participants generally held negative opinions of psychology compared to other disciplines. Notably, their findings suggested no difference in ratings of psychology between college faculty and the general public. Therefore, the negative perception of psychology is not confined to the lay public.

"The Seductive Allure of Neuroscience"

Although research has shown that generally psychology is perceived as unscientific, psychological concepts and phenomena can appear to be more scientific when they are combined with those of other disciplines. For instance, Weisberg et al. (2008) demonstrated the seductive allure of neuroscience; that is, an effect where participants judge explanations of psychological phenomena as more satisfying when they include irrelevant neuroscience information. Three groups of participants (i.e., naïve adults, neuroscience students, and neuroscience experts) rated good and bad explanations of psychological phenomena with and without neuroscience jargon. Notably, the neuroscience jargon used was irrelevant to the explanations. When the three groups were compared, the results demonstrated that the presence of neuroscience information had the ability to make bad explanations look more satisfying for naïve adults and neuroscience students. The experts were not swayed.

It would be reasonable to argue that participants were rating the bad neuroscience explanations as good due to some "authoritative aesthetic", where neuroscience information added some sort of merit to the explanation regardless of content. In an attempt to examine this possibility, Weisberg, Taylor, and Hopkins (2015) asked participants to review two descriptions of psychological phenomena and to choose the best one. When both descriptions either included or excluded neuroscience, the participants successfully selected the good explanations over the bad ones. When the bad explanations contained neuroscience information and the good ones did not, however, the participants were more likely to prefer the bad ones. Moreover, undergraduate participants were more likely to justify their choice by claiming that neuroscientific information added value to the explanations than were individuals recruited from the general public.

Weisberg et al. (2015) concluded that the undergraduates may have been using the presence of neuroscience information as a heuristic when judging the quality of explanations of psychological phenomena.

Weisberg et al. (2008) and Weisberg et al. (2015) have provided evidence to suggest that psychological phenomena can be perceived to be more scientific when they are associated with neuroscience terminology. In related experiments, McCabe and Castel (2008) demonstrated that psychology could be perceived to be more scientific with the addition of neuroscience images. Participants rated how scientific articles about psychological phenomena were. Notably, some articles had images of brains while others did not. Their results suggested that people were more likely to rate psychological articles as scientific when they included images of the brain. Michael, Newman, and Vuorre (2013) attempted to replicate these findings. When they were unable to do so, they conducted a meta-analysis and found that brain images had little-to-no effect on the extent to which articles were rated to be scientific. However, Ikeda, Kitagami, Takahashi, Hattori, and Ito (2013) contested this conclusion. They also investigated how brain images affected individuals' perception of research. Participants were given a text about neuroimaging findings. They were asked to first read the text, rate their comprehension, and then complete a comprehension test. The experimental group read text accompanied by brain images, while the control group read text only. The results demonstrated that participants' self-reported comprehension in the experimental group exceeded that of the control group. However, actual scores on the comprehension test indicated no significant difference between groups' objective comprehension. It seems fair to speculate that the assistance of the images may have boosted participants' confidence in their comprehension. In order to address this concern, Ikeda et al.

conducted a similar experiment whereby the control group read text accompanied by a bar graph. The results of this experiment were consistent with the first. Furthermore, participants rated the credibility of the text higher when the text was accompanied by brain images compared to bar graphs. Together, these findings suggest that the use of brain images can increase individuals' subjective judgments of research findings. Moreover, these results provide further support for McCabe and Castel's hypothesis that psychology can be perceived to be more scientific with the assistance of neuroscience images.

In summary, this line of research appears to provide support for the notion that irrelevant and extraneous cues can alter people's perception of scientific research. Moreover, these studies can provide a basis upon which to help explain why psychology is not perceived to be scientific. Still, concrete empirical evidence to understand the cognitive mechanisms underlying the issue is lacking. Therefore, the aforementioned research findings warrant further investigation into these underlying cognitive mechanisms.

Cognitive Mechanisms

Some researchers have attempted to understand such cognitive mechanisms (e.g., Hernandez, 2016; Krull & Silvera, 2013; Morgan, 2015; Rhodes, Rodriquez & Shah, 2014). Interestingly, these experiments share one key commonality: their findings suggest that a dual-process theory of cognition might explain the cognitive mechanisms underlying the perception of psychology as unscientific and unimportant.

Dual-Process Theory

Dual-processing accounts of cognition suggest that human reasoning comprises two thought processes (Kahneman, 2011; Stanovich, 2004). These processes are defined by two systems controlled by differential operations: one controlled and conscious, and the other automatic and unconscious. Stanovich (2004) describes the implicit System 1 as an associative, holistic, parallel, automatic, relatively fast, and highly contextualized system with low capacity requirements. Conversely, the explicit System 2 is portrayed as a rule-based, analytic, serial, controlled, relatively slow, and highly decontextualized system with high capacity requirements. In the context of their work on attitude change, Gawronski and Bodenhausen (2006) have argued that these two systems may best be distinguished by the associative and propositional processes that they engage. According to their Associative and Propositional processes in Evaluation (APE) model, people seek to justify implicitly held attitudes via the explicit consideration of propositional knowledge that supports them. In other words, they seek to justify attitudes that are generated associatively outside of consciousness (See also Nisbett & Wilson, 1977). Nonetheless, a variety of factors can encourage them to consider additional explanations and thus arrive at consciously established attitudes. Consequently, dual-process accounts of cognition implemented in models like APE suggest that people's misconception about psychology's status as a science may be strongly determined by implicit associative knowledge. Because psychology does not resemble the other natural sciences in topic or objects of study, people may conclude that it is not a science.

Thus, individuals' implicit system might lead them to perceive psychology as unscientific, despite their ability to explicitly reason that it is, in fact, a science. This differentiation between implicit and explicit systems has provided a basic level distinction that has been developed in formal cognitive models (e.g., Beevers, 2005; Klaczynski, 2004; Mega & Voltz, 2014; Strack & Deutsch, 2015; Verschueren, Schaeken, & d'Ydewalle, 2005). System 2 has been shown to dominate the response selection throughout the early stages of learning novel tasks (Logan, 1988). Once learning has occurred, System 1 tends to dominate unless System 2 intervenes (e.g., Ball, 2011; Shiffrin & Schneider, 1977; Norman & Shallice, 1980).

One example of System 1 dominating the response selection is chronic accessibility. For something to become chronically accessible means that particular trait dimensions that tend to capture attention and repeatedly surface in impressions are habitually coded into schemata that are more easily activated and thus made more salient (Bargh, 1984). For example, Higgins, King, and Marvin (1982) showed that individuals are more likely to retain information that is congruent with their impressions of other people. Their participants first created a behavioral description of a target person by listing traits. The frequency of the traits listed served as a measure of chronic category accessibility. Weeks later, these participants were asked to read a non-related behavioral description of another individual. These descriptions had both accessible and non-accessible traits within the text. They found that participants were more likely to ignore information that was irrelevant to their accessible constructs. Therefore, the measure of chronic accessibility predicted which parts of information participants would retain.

Furthermore, Bargh (1984) argued that people require relatively low amounts of attentional resources to activate and retain chronically accessible categories and category features. Additional support for this argument is provided by Hayes-Roth's (1977) theory of knowledge-assembly, which suggests that knowledge is stored in a network of nodes and connections in a relational manner. This theory supports the notion that the adult mind has previously constructed schemata for knowledge based on experience.

Hence, it is possible that the natural sciences (i.e., biology, chemistry, and physics) tend to be thought of as typical sciences due to the fact that over time they are habitually coded into a schema for science and are thus made more chronically accessible. Because associative links have been determined for terminology beforehand (Sloman, 1996), it is plausible that individuals engage in implicit-type reasoning (i.e., System 1) when rating the degree to which a discipline is genuinely scientific. By engaging System 1 to make judgments, such as how scientific a discipline is, it is possible that individuals are utilizing mental shortcuts known as heuristics.

Heuristics. Heuristics are relatively simple "rules of thumb" that people use to make inferences about their surroundings (Sternberg, 2004). They are used to diminish cognitive processing load because they preempt the need to consider various alternative possibilities or meticulously form all-inclusive and thorough representations to find the solution to a problem (Roberts, 2004). Tversky and Kahneman (1974) posited three heuristic-type methods by which individuals make judgments when faced with uncertainty (i.e., representativeness, availability of instances or scenarios, and adjustment from an anchor). Similarly, Chater and Oaksford's (1999) probability heuristic model predicts that individuals are more likely to resort to heuristic-type reasoning over logic when considering possible conclusions. These theories suggest that it is plausible to expect people to use heuristic-type reasoning when judging how scientific or important an academic discipline is. Unfortunately, while heuristics can lead to speedy and sometimes even accurate judgments, they also have the potential to lead to systematic and predictable errors (Tversky & Kahneman, 1973).

For instance, Rhodes, Rodriquez, and Shah (2014) also examined the seductive allure of neuroscience. Similarly to Weisberg et al. (2008) and Weisberg et al. (2015), they found that irrelevant neuroscience jargon could be used to manipulate people into believing that they held a more in-depth understanding of mechanisms that explained behavioral phenomena. Interestingly, however, they controlled for participants' disposition to think. They hypothesized that this factor would attenuate the biasing effect of neuroscience jargon on scientific reasoning. However, the results suggested instead that those who were more disposed to think were in fact more vulnerable to the biasing effect of neuroscience jargon. In other words, those who were more disposed to think were perhaps more likely to use the vividness of neurology's terminology as a heuristic because it led them to retrospectively remember the statements as being more scientific than they actually were.

The representativeness heuristic has also been implicated within the research on psychology's perception as unscientific. Individuals tend to use this heuristic under uncertainty, in an attempt to estimate how likely a given item belongs in a particular category, by matching salient features about the category against essential characteristics of the item (Bar-Hillel & Neter, 2002). For instance, the subjective probability that an animal is to be classified as a mammal is based on the degree to which the description of the animal matches the features of mammals in general. Thus, the method by which individuals process categorical information might affect their ability to classify psychology as a science because the representation of psychology may not be in line with the features of science.

Hernandez (2016) examined this possibility in a two-part study using 20 common academic disciplines (i.e., Engineering, Medicine, Physics, Neurology, Chemistry, Mathematics, Computers, Astronomy, Biology, Economics, Law, Linguistics, Archaeology, Philosophy, Business, Anthropology, Psychology, Agriculture, History, Geography, and Sociology). In a free listing paradigm (see Brewer, Garrett, & Rinaldi, 2002), participants were first asked to list as many scientific disciplines as possible. The typicality of each discipline was measured by how frequently it was listed and by the rank-order in which it appeared. Then, the twenty most typical scientific disciplines were used in a family resemblance paradigm (Rosch & Mervis, 1975). For each discipline, the participants were asked to list as many features as possible. Here, typicality was measured by the number of shared attributes among the scientific disciplines. Finally, participants were asked to rate the disciplines on their level of difficulty using a Likert scale. Hernandez hypothesized that the typicality of psychology would be considerably lower than the natural sciences (i.e., biology, chemistry, and physics), that the natural sciences would share similar features, and that these features would differ from those generated by psychology. Additionally, Hernandez expected to find a relationship between typicality and the perceived difficulty of academic disciplines. Overall, the hypotheses were supported. Chemistry, physics, engineering, and neurology had higher typicality ratings than did psychology. Furthermore, Hernandez found that participants listed terms such as “observation”, “theory”, and “research” relatively infrequently when listing features of the typical sciences. Perhaps when individuals think of science, the methodologies by which topics are studied are not evoked in the mental model associated with the term. Thus, it is plausible to suggest that there is a misunderstanding of what it means for a discipline to be genuinely scientific. Individuals may use the representativeness heuristic when assessing how scientific psychology is. That is, when attempting to categorize academic disciplines as either science or not, individuals may match salient features about the category *science*, such as topics (e.g., chemistry), and objects (e.g., microscopes) against characteristics of the target discipline. Therefore, since psychological topics and objects do not typically match science's category features, individuals would be less likely to categorize the discipline as scientific. Hence, these results have provided support for the investigation of dual-process accounts of reasoning in understanding the cognitive mechanisms that underlie the skepticism toward psychology within the scientific community. Moreover, the results might suggest that the issue underlying the misperception of psychology as unscientific is rooted in the misperception of the term science.

Misperception of science. Wood, Jones, and Benjamin (1986) examined the public's perception of psychology. They found that psychology tended to be viewed favorably, but that people failed to understand how it impacts society. Perhaps then, psychology's negative public image can be conceived of in two different ways: how the public feels toward the discipline (i.e., favorability) and what the public knows about the discipline (i.e., understanding) (Hartwig & Delin, 2003). It is also possible that people misunderstand core scientific concepts such as experiment, hypothesis, and theory. Consider *experiment* for instance. Many people might be unable to differentiate between the expressions *experiment* and *demonstration*. An example from a general statistics textbook illustrates this point quite clearly:

> For many persons, the first concept of an experiment was in a high school or elementary school class. For example, a high school science teacher might demonstrate the influence of atmospheric pressure on boiling temperature by showing that water will boil at room temperature in a near vacuum. We note that this example was not an experiment, but was simply a demonstration. Designed experiments are conducted to demonstrate a cause-and-effect relation between one or more explanatory factors (or predictors) and a response variable. The demonstration of a cause-and-effect relationship is accomplished,

> in simple terms, by altering the levels of the explanatory factors (i.e., the X s) and observing the effect of the changes on the response variable Y. Furthermore, designed experiments are frequently comparative in nature. (Applied Linear Statistical Models, p. 643)

Similarly, the term *science* might be in and of itself misunderstood. Unfortunately, the term is largely used in order to provide a discipline with some sort of merit or reliability (Chalmers, 2013). For instance, several disciplines (e.g., Neuroscience, cognitive science, computer science, food science, and Christian Science) are labeled as science, but yet clearly differ with regards to the extent to which they are legitimately scientific.

One possible source for people's misconception about psychology may be the false belief that sciences are defined by their object of study rather than their methodology. For instance, Krull and Silvera (2013) conducted three experiments to examine the perception of psychology as a science. The first two experiments compared the degree to which participants' ratings of topics (e.g., social interactions, cancer, and cognition), equipment (e.g., mirrors, questionnaires, and microscopes), and scenarios (e.g., "Dr. Davis studies attitudes. To do this research, Dr. Davis uses photographs.") were scientific. In their third experiment, Krull and Silvera extended upon their first two experiments adding a measure of importance. Participants rated psychology topics and equipment as less scientific and less important than those of other scientific disciplines. Overall, these results suggested that individuals had preconceived schemata for the term science that are more in-line with the natural sciences. Thus, the topics and the equipment associated with psychology were a poor fit for a science schema, which led to these lower participant ratings.

I would also argue that Krull and Silvera's (2013) results are consistent with a dual-process explanation. More specifically, the participants might have been using heuristic System 1 processing to provide the ratings. Whether or not individuals can explicitly define science (a System 2 function), relevant cues can independently elicit a System 1 response. Specific experimental cues (e.g., topics and equipment) can evoke schemata that are either congruent or incongruent with the preconceived concept science. Thus, even though psychology is a science, the mental images that it evokes might be different from those evoked by the term science and the natural science disciplines (e.g., biology, chemistry, and physics). If the main issue is that there is a lack of understanding of what science truly is, then one major impeding factor might be the public's understanding of science topics and methodology (i.e., their scientific literacy).

Scientific literacy. Scientific literacy is a collection of skills and knowledge that includes the understanding of how scientific knowledge is gained, how it evolves, and how it can be differentiated from other types of information (Impey, Buxner, Antonellis, Johnson, & King, 2011). The scientifically literate individual is capable of thinking critically (i.e., able to evaluate the quality of scientific information) and understands the intimate relationship between theories and empirical evidence. People must be taught to be scientifically literate because this skill is deeply important to understand and evaluate research findings presented in the media.

Miller (1983) postulated a multidimensional definition of scientific literacy comprising three key dimensions: an understanding of scientific methodology, an understanding of important scientific terms and concepts, and an understanding of the impact on society that is made by science. Because science profoundly shapes human culture, the scientific literacy of the general public is imperative. While Miller's "three constitutive dimensions" are undoubtedly necessary in constructing the definition of scientific literacy, the Science for All Americans model of scientific literacy also recommended the inclusion of values, attitudes, and thinking skills (AAAS, 1989).

Thus, Durant, Evans, and Thomas (1989) created a scientific literacy test that comprises Miller's three key dimensions and the Science for All Americans model's measure of attitude toward science. These researchers surveyed the general public using a scientific literacy questionnaire that tested individuals' understanding of processes of scientific inquiry, their understanding of scientific knowledge, and their attitude toward science. Their findings were a cause for concern. While participants generally held positive attitudes toward modern science, they lacked knowledge about its cultural achievements. However, the more informed participants were, the more positively their attitudes toward science were. So, it seems as though there is potential for the scientific community to assist in improving the public's perception and understanding of science, as well as its attitude toward it.

More recently, Laugksch and Spargo (1996) developed a pool of scientific literacy questions based on the American Association for the Advancement of Science's (AAAS, 1989) literacy goals. After providing a rationale for test items, Laugksch and Spargo measured content, construct, and item validity and concluded that the bank of questions could be used for constructing measures of scientific literacy for a variety of purposes. Still, the assessment of the understanding of basic scientific methodology appears to be missing (e.g., the difference between hypotheses, theories, and laws). Moreover, this bank of test-items does not include any mention of the social sciences. Hence, there is currently no comprehensive scientific literacy test. Because psychology evidently meets the requirements to merit its categorization as a scientific discipline, test-items in a scientific literacy questionnaire should include psychological research questions.

Semantic associative networks. Another means of exploring individuals' preconceived schemata for science is examining its semantic associative network. For instance, one plausible explanation as to why psychology is perceived as unscientific is that the natural sciences (e.g., biology, chemistry, and physics) are highly associated with the concept *science* while psychology is not. Concepts are stored in semantic memory in a relational manner and the meaning of words is based on relationships with others in memory (Figueroa, Gonzalez, & Solis, 1976). Such relationships compose diverse and complex networks in the human mind in order to produce meaning for terminology (Goñi et al., 2011). These networks are known as semantic associative networks, which comprise nodes (i.e., words or concepts) and connections between nodes (i.e., semantic relationships between words or concepts). Such networks are represented by mental models, where terminology prompts imagery and concepts within the network (Raaijmakers & Shiffrin, 1981). Moreover, networks are adaptable and evolve as individuals gain experience and knowledge (Alexandridis & Maru, 2012). For instance, depending on a word's context, different networks may be induced (Ratcliffe & McKoon, 1978). For example, the word "bank" brings to mind very different imagery depending on its context (e.g., river or money). Similarly, if a person is asked to imagine pursuing a career in psychology, the imagery evoked might be much more strongly associated with a mental health setting than an experimental one. Hence, since individuals have previously constructed schemata for each discipline embedded in a semantic associative network, psychology's typical context may influence its perception in the human mind. Consequently, this might lead individuals to believe psychology is not related to science. The two primary methodologies for studying semantic networks are structural analysis and associative recall tasks (Marupaka, Iyer, & Minai, 2012). While structural analysis examines extremely large sources of text (e.g., dictionaries and textbooks), associative recall tasks include word association paradigms such as free association (e.g., Nelson et al., 2000).

Free association. Free association is a paradigm that allows researchers to explore the underlying semantic strength between words. A discrete free association task evaluates single-response words (i.e., associates) specified for a particular term of interest (i.e., cue). In such tasks, participants are asked to list the first word that comes to mind that is meaningfully related to the cue word. Semantic association is calculated by analyzing the frequency of words produced by each cue. Subsequently, an index of the relative accessibility of related words in memory can be created. Nelson et al. (2004) have generated a database containing over 72 000 word pairs along with a number of related data. For instance, semantic strength between word pairs are given in terms of cue to associate strength (FSG), associate to cue strength (BSG) and the strength between two cue words (OSG). FSG measures how strongly each target associate of interest is semantically associated with its respective cue of interest. It is measured by how many people responded with the target associate when presented with the target cue, relative to how many people responded to the cue. BSG measures how strongly each target cue of interest is semantically associated with its respective associate of interest. It is measured by how many people responded with the cue of interest when presented with the target associate (when the associate was considered a cue). OSG measures how strongly each cue of interest is semantically associated with another cue of interest. It is measured by assessing the overlapping associates between any two cue words. Each associate's FSG is calculated for both cue words and multiplied to create a product FSG (pFSG) for each overlapping associate. Finally, the pFSGs are summed and can then be used to describe the semantic strength between the cues. Since free association has been demonstrated to be a successful means for analyzing semantic associative networks (Marupaka et al., 2012), it provides a means to empirically analyze the semantic strength between psychology, science, and the natural sciences (i.e., biology, chemistry, and physics).

While Nelson et al. (2004) have provided a public database with word norms and their respected semantic strengths, the collection of this data dates back to 1973. The semantics associated with terminology tend to evolve over time, either by semantic change or transfer of meaning (Lehrer, 1978). Semantic change refers to terminology's change in connotation, which may become increasingly positive or negative over time and its change in potential usage, which may broaden or narrow over time (Győri, 2002). For instance, the term *dog* stems from the Old English term *dogge* and referred to one breed of canine. Over time, the term changed to be inclusive of all breeds (Crowley & Bowern, 2010). While Nelson et al.'s word norms may continue to be useful for some experimental work in psychology (e.g., semantic priming), it seems unreasonable to expect them to measure a contemporary perception of psychology.

Morgan (2015) conducted a large-scale discrete free association study to examine the possibility that psychology is perceived to be semantically different from the natural sciences. It was hypothesized that if difference in semantics exists, then the words evoked for the cue *psychology* would be different than those evoked for the cues *science*, *chemistry*, *biology*, and *physics*. Using a stimuli set of 20 common academic disciplines (similar to Hernandez, 2016), university undergraduate students (enrolled in either introduction to psychology or research methods) were asked to provide the first word that came to mind when shown a cue word. Overall, the hypotheses were supported, as there were fewer common terms evoked by psychology and science than any other pairing of science and the natural sciences.

Figure 1 depicts the associates that were generated for the cue *science*. The larger the word, the more participants elicited that associate for science. Interestingly, the most common associate for the cue word *science* was the term *experiment*. Researchers such as Winston and Blais (1996) have suggested that the process of defining the term *experiment* is complex, and that the terms experiment and scientific method should not be used interchangeably. While the way in which scientific knowledge is acquired cannot be explained by the term experiment alone,

Figure 1. Visual depiction of the associates generated for the cue *Science.* Word size corresponds to the number of times a cue word was given as an associate.

experiments are a common component of methodologies within all scientific disciplines. For the purposes of this thesis, we will adapt Winston and Blais' textbook definition of experiment: "manipulating an independent variable, holding all other events constant, and observing the effect on a dependent variable" (p. 599). Additionally, the participants produced the term *experiment* for both psychology and science in addition to the terms *research* and *study*. It is possible that students' education in psychology induced a methodology-specific schema for psychology. It is also plausible, however, that participants may have been implicitly aware that psychology follows the rigor of science, regardless of their education. Notwithstanding these considerations, the participants did not generate the term *science* when they saw psychology, nor did they generate the term *psychology* when they saw science. Perhaps participants were unwilling to label the discipline as a science per se. In order to test this claim, it would be necessary to ask participants whether or not they believe psychology to be a science.

The results of Morgan (2015) provided empirical evidence to suggest that there may be a misperception of the terms *science* and *psychology*. Nevertheless, all three of the common terms elicited for the cues *science* and *psychology* (i.e., *research*, *study*, and *experiment*) comprise a sample of expressions that would exemplify the process by which scientific knowledge is gained. Perhaps these terms elicit different meanings in one's mind depending upon the context in which they are evoked. To illustrate this point more clearly, when individuals think of research in science, they may think of microscopes and lab coats. Meanwhile, when they think of psychological research, they might think of questionnaires (Krull & Silvera, 2013). More evidence to suggest that science is conceived of as the topic of study rather than the methodology is provided by Morgan's results. For instance, when participants were shown the cue *science* or natural science cues, they generated associates that exemplify topics of study (e.g., *evolution*, *life*, *molecule*, *nature*, *atom*, *energy*, and *gravity*) rather than the method by which such knowledge is attained.

However, these results also demonstrated that science is not the only term that appears to be misunderstood. When common associates between cues were analyzed to examine their relative strength, psychology very closely resembled psychiatry and neurology. This suggests that the association of the term *psychology* with more clinical features (e.g., psychotherapy and mental illness) may further distance the discipline from stereotypical scientific objects of study (e.g., microscope and lab coats). From a categorical point of view, the perceived connection between psychology and the medical field may lead individuals to classify psychology as a helping profession rather than a scientific one, thus, leading them to decide that psychology is not a science.

One limitation of Morgan's (2015) study was that researchers were unable to compare participants' implicit and explicit perception of psychology as a science. However, in order to examine whether implicit reasoning is the root to the public's perception of psychology as unscientific, it must be shown that, when people are forced to use explicit reasoning, they generally believe psychology to be scientific.

Study

The goal of this thesis was to investigate the possible cognitive mechanisms underlying the skepticism of psychology as a science. Psychology is the empirical study of human behavior and can be straightforwardly demonstrated to be a science. Unfortunately, however, the literature reviewed has demonstrated that psychology has been struggling to be accepted as a legitimate science. Evidence has shown that psychology is perceived to be unscientific (e.g., McCabe & Castel, 2008; Weisberg et al., 2008; Weisberg, Taylor & Hopkins, 2015) and unimportant (e.g., Janda et al., 1998; Krull & Silvera, 2013; Wood, Jones & Benjamin, 1986). Hence, even though psychology can be clearly demonstrated to be scientific, it is not perceived to be a scientific discipline in the eyes of the general public.

While various researchers have attempted to examine this phenomenon (e.g., Hartwig & Delin, 2003; Holmes & Beins, 2009; Krull & Silvera, 2013; McCabe & Castel, 2008; Michael, Newman & Vuorre, 2013; Rhodes, Rodriguez & Shah, 2014; Weisberg, Taylor & Hopkins, 2015), such investigations have yet to empirically establish the cognitive mechanisms that might be responsible for it. For instance, some have investigated the so-called allure of neuroscience, which can be conceptualized as a type of heuristic, where individuals use neuroscience concepts, such as jargon and images, to judge psychological findings as more scientific (e.g., McCabe & Castel, 2008; Michael, Newman, & Vuorre, 2013; Rhodes, Rodriguez & Shah, 2014; Weisberg, Taylor & Hopkins, 2015). However, while these studies have provided a means to establish the phenomenon, they do not provide empirical evidence to suggest any one particular cognitive mechanism. The representativeness heuristic has also been implicated in the debate. Hernandez (2016) examined the typicality of science and psychology and posited that individuals' method of processing categorical information may underlie the skepticism of psychology within the scientific community. This research provides support to suggest a dual-processing account of reasoning is worth investigating.

Thus, this thesis aimed to examine whether a dual-processing account of cognition could explain psychology's perception as unscientific. More specifically, even if people have an explicit understanding that psychology is a science, the discipline might be implicitly perceived of as different from other scientific fields of study (e.g., biology, chemistry, and physics). One possible difference in the implicit perception of the scientific disciplines is the schemata that are evoked. Krull and Silvera (2013) and Morgan (2015) have provided evidence to suggest that the schemata for the sciences are constructed by their topics and objects of study rather than their methodology. Therefore, it is possible that the schema for psychology that is represented by objects and topics is different from those of *typical* sciences. Hence, despite psychology's adherence to methods common to other scientific fields of study, the implicit perception of it may remain "unscientific" due to the subject matter that it studies.

This possibility was examined by replicating and extending Morgan's (2015) study. A discrete free association paradigm (Nelson et al., 2004) was used in order to examine the semantic association between popular academic disciplines. While 30 academic disciplines were used to hide from the participants the true nature of the research, those of interest were *psychology*, *science*, *chemistry*, *biology*, *physics*, and *neuroscience*. These 30 academic disciplines were also rated by participants on six different dimensions: specificity, concreteness, difficulty, imageability, importance, and the extent to which the discipline is thought to be scientific. Different semantic networks were constructed for groups based on scientific expertise and current level of education in psychology. Therefore, a scientific literacy questionnaire, comprising questions on the knowledge of topics and methodologies and attitude toward science, was also administered. This questionnaire was devised using the bank of test items from Laugksch and Spargo (1996) with the addition of a few questions regarding the social sciences and the evolution of science. In order to compare participants based on current level of education in psychology, participants were asked which program of study they were in and what their current year of study was. Lastly, an explicit measure of participants' judgments about psychology as a science was used. More specifically, participants were asked whether or not they believe psychology to be a science. Then, they were asked to define the term science, given the opportunity to change their answer to the question "Is psychology a science?", define the term psychology, and were given one last chance to change their answer.

In an attempt to examine whether a dual-processing account of cognition can assist in explaining the cognitive mechanisms underlying the perception of psychology as unscientific, four hypotheses were formulated. First, if psychology's perception as unscientific is rooted in individuals' implicit perception of the discipline, the semantic strength between science and the natural sciences will be stronger than that between science and psychology. Moreover, the semantic strength between the natural sciences will be stronger than that between psychology and any of the natural sciences. Second, if science is conceived of as the topics and objects of study rather than methodology, participants should be more likely to list objects and topics rather than methodologies; the methodologies generated for psychology and science should be similar; and the topics and objects generated for science should be similar to the natural sciences and neuroscience, but different from psychology. Third, if a dual-processing account of cognition can explain the perception of psychology as unscientific, individuals' explicit belief of psychology as scientific should operate independently of their implicit perception. Furthermore, while psychology-specific education and scientific literacy should impact participants' willingness to categorize psychology as a science, it should not affect their implicit perception (i.e., the semantic relatedness between psychology, science, and the natural sciences). Lastly, if the perception of psychology as unscientific can be explained by implicit reasoning errors, then the ratings of psychology as scientific should be relatively high. However, its ratings on any other dimension that might predict the scientific ratings should be low compared to the other cues of interest.

Method

Participants

Five hundred and seventy participants were recruited from both Carleton University and the general public. The SONA system provided by Carleton University was used to recruit 464 university undergrads. These participants received 1% bonus credit in their introductory psychology course as compensation for their participation. The Social Psychology Network (SPN) was also used to recruit 18 persons from the general public. The SPN is a website that specializes in assisting researchers with the recruitment of participants for online experiments in the area of social and personality psychology. A brief advertisement was placed on the SPN website to invite volunteers to take part in the study. These participants received no compensation for their participation.

Materials

The stimuli that were used in this study consisted of 30 cues, which comprise a list of academic disciplines (as shown in Table 1) selected to represent a variety of common university programs offered in North America. The stimulus set of academic disciplines was used by Morgan (2015) with a few exceptions. First, Academic Discipline, Applied Discipline, and Theoretical Discipline were dropped because the results of Morgan's free association study proved them to be uninteresting. Second, after reviewing multiple university calendars across

North America, the following disciplines were added to the stimuli set: Criminology, Geography, History, Humanities, Sociology, Statistics, and Theology. Finally, Neurology was changed to Neuroscience to maintain consistency within the literature. The cues of interest for this present study are Psychology, Science, Chemistry, Biology, Physics, and Neuroscience.

Table 1

List of Cue Words

	Cue Words	
Agriculture	Criminology	Music
Anthropology	Economics	Neuroscience
Archaeology	Engineering	Philosophy
Architecture	Geography	Physics
Art	History	Psychiatry
Astronomy	Humanities	Psychology
Biology	Law	Science
Business	Linguistics	Sociology
Chemistry	Mathematics	Statistics
Computing	Medicine	Theology

Note: Cues are listed in alphabetical order.

Procedure

Free Association Task

Participants took part in a discrete free association task (Nelson et al., 2004). Participants were asked to provide the first word that came to mind that was meaningfully related or strongly associated to the cue expression. In order to avoid chaining effects, participants were asked to only list one word associate per cue. This has been labeled a single-response paradigm (Nelson et al., 2004). For example, given the cue *medicine*, participants might respond “doctor” or “nurse”, but not both. Each cue was displayed one at a time and the order was randomly generated for each participant. However, due to the fact that the cue *neuroscience* contains the word *science*, it was always displayed last. This was done in order to avoid potential priming effects, that is, participants might respond to any cue with the word *science*, simply because they have seen the word *science* before, thus confounding the results. Participants typed all responses into the computer.

Rating Task

Participants were presented with the 30 cue words and were asked to rate them on six different dimensions: concreteness, difficulty, imageability, importance, specificity, and how scientific the discipline is. The instructions that were given to the participants are shown in Table 2. They were asked to provide their rating using a five-point Likert scale comprised of clickable stars, where one star indicated a low rating and five stars indicates a high rating. Participants were told to provide ratings based solely on their opinions and that there were no right or wrong answers. The dimensions were displayed one at a time and randomized (although the dimension *scientific* was always displayed last). Likewise, the order of the 30 cues was randomly generated for each dimension and each participant.

Scientific Literacy Questionnaire

The scientific literacy questionnaire used in this present study is an adaptation of Impey et al. (2011). The format of some questions, however, was changed to true or false statements in order to maintain consistency throughout the questionnaire. This present scientific literacy questionnaire included three parts (The full measure appears in Appendix A).

Table 2

Instructions for Each Dimension

Dimension	Instructions
Concreteness	A concrete discipline is defined as one that studies topics that can be experienced by the senses. For instance, geology is a discipline that studies rocks. Because rocks can be experienced by the senses (such as seen, and felt), geology is considered a concrete discipline. In contrast, drama is a discipline that studies how best to portray written work using actions and emotions. These actions and emotions do not exist in a physical form, thus drama is considered to be an abstract discipline, rather than a concrete one. In your opinion, how concrete is each of the following disciplines?
Difficulty	In your opinion, how difficult is each of the following disciplines?
Imageability	Imageability refers to how well you are able to picture something in your mind. For instance, while it may be simple to imagine the term table, it may be much more difficult to picture the term better. In your opinion, how imageable is each of the following disciplines?
Importance	In your opinion, how important is each of the following disciplines?
Scientific	In your opinion, how scientific is each of the following disciplines?
Specificity	Some disciplines are said to be broad or general, whereas others are said to be more specific. In your opinion, how specific is each of the following disciplines?

Note: Dimensions are listed in alphabetical order.

Knowledge of topics. Participants were shown 17 scientific statements (e.g., The oxygen that we breathe comes from plants) and asked to say whether they are true, probably true, probably false, or false. A few statements were added for the purposes of the study: “Sunlight can cause skin cancer.”; “Hot air rises.”; “The liver makes urine.”; “Most people only use 10%

of their brain's processing capacity."; "Opposites attract: people are typically attracted to partners who differ from them."; "Human memory works like a video or tape recorder."; and "The psychiatric disorder known as autism is caused by prior exposure to mercury-based vaccines." All 17 statements were displayed on the screen in a list, where participants clicked on the associated bubble to make their choice. However, the order of the statements was randomized for each participant.

Knowledge of methodology. This second section was devised for the purposes of this study and assessed participants' knowledge of scientific methodology. Participants were given 11 short scientific scenarios (see Table 3 for an example) and asked to identify the conclusion that follows from a selection of possible answers. Each scenario was displayed one at a time and the order of the statements was displayed at random for each participant. Likewise, the possible conclusions for each statement were also randomized.

Table 3

Example of Short Scientific Scenario

Scenario	Possible Answers
A doctor tells a couple that they have a one in four chance of having a child with an illness. Does this mean that,	a. If they have only three children, none will have the illness? b. If their first child has the illness, the next three will not? c. Each of the couple's children will have the same risk of suffering the illness? (The correct answer) d. If the first three children are healthy, the fourth will have the illness?

Attitude toward science. Once more, the items from Impey et al. (2011) were used, but three questions were added for the purposes of this study: "All of today's scientific theories will still be accepted in a hundred years' time."; "Natural vitamins are better for you than laboratory-made ones"; and "Theories founded in psychology can be attributed to common sense". Participants were asked to think about their answers carefully and told that they would not be given the chance to go back to change their answers. Furthermore, they were encouraged to answer the questions to the best of their ability and to not look up the answers elsewhere. Participants were asked to give their opinion about scientific topics using a 5-point Likert scale. They were asked to tell us how strongly they agree or disagree with each of the 20 statements (e.g., Genetic engineering is a good idea.) All 20 statements were displayed on the screen in a list, where participants clicked on the associated bubble to make their choice. However, the order of the statements was displayed at random for each participant.

General procedure

This study was conducted online using Qualtrics (Qualtrics, Provo, UT). It recorded all responses and coded them into a spreadsheet. Participants were told that the goal of the study was to examine the perception of academic disciplines. The participants first gave their informed consent and then proceeded to the discrete free association task. Subsequently, participants took part in the rating task, after which the following demographic information was collected: age, gender, country of residence, level of education, type of education (i.e., program), and current year of study (if still in school). Participants were also asked whether or not they considered their field to be scientific and whether or not they identified as a scientist. Finally, they were requested to rate the extent of their scientific training, their fluency in English; and their fluency in any other language that they knew. The demographics questions appeared after the free association task and rating task in order to avoid priming the idea of science before the study.

In the last part of the study, participants completed the scientific literacy questionnaire. Subsequently, participants were asked to describe, in a few words, what they believe to be the goals of the study. This was to ensure participants are indeed still naïve to experimental conditions. Finally, participants were asked explicitly "Is psychology a science?" and also "Why (not)?" Afterwards, they were asked if they would like to change their answer. Then, they were asked to define science before finally being allowed to alter their answer one last time. In total, the study lasted approximately 30 minutes.

Results

Demographics

Sixty-two participants were removed from the dataset due to non-compliance (i.e., 19 did not accept the consent form and 43 completed less than 10% of the study). After removing this 12% of the participants, 501 remained for the analyses. Finally, while 7 participants were able to guess the research hypothesis (or some version of it) at the experimental checkpoint (e.g., "why do you believe psychology is not a science?"), their data were analyzed separately and no key differences were found. Hence, they were included in all the analyses.

Demographic information was obtained for 482 participants (280 males and 196 females, with a mean age of 20). Ninety-two percent of participants listed Canada as their country of origin, 3% listed the USA, 2% listed China, and 2% were from 9 other countries. Seventy-four percent reported their English fluency as "Excellent", 17% reported "Intermediate", and 8% reported "Good" or lower (the mean number of second languages spoken fluently was less than 1, with a maximum of 5). Fifty-seven percent of participants reported their extent of scientific training as “Beginner”, 22% reported “None”, 19% reported “Intermediate”, and 1% reported “Advanced”.

Education

Sixty-five participants had completed a bachelor’s degree or more, whereas 417 participants had not. Of those who were currently enrolled in a university program, 256 were first year students, 122 were second year students, 52 were third year students, and 28 were fourth year students. Five participants were graduate students and 100 participants did not disclose this information.

Ninety-nine participants were psychology majors, whereas 383 were non-psychology majors. The Non-psychology students listed a variety of other majors such as chemistry, journalism, and linguistics (the full list is presented in Table 4). Of the non-psychology students, 30 listed natural science majors (e.g., biology, biochemistry, and chemistry). Due to small sample sizes in the upper year groups (i.e., students in second year or higher), these groups were collapsed. Of the psychology students, 36 were first years and 62 were upper year students. Of the Non-psychology students, 220 were first years and 145 were upper year students. Of the natural science students, 16 were first years and 14 were upper year students.

Table 4

Sample Sizes for Program Majors

Program	Sample Size
Psychology	99
Criminology	66
Cognitive Science	30
Computer Science	25
Law	24
‡Biology	21

Business	20
Commerce	15
Communications	12
Health Science	12
Journalism	11
Neuroscience	11
Child Studies	9
Linguistics	8
Social Work	8
English	6
History	6
Political Science	6
Engineering	5
Sociology	5
‡Biochemistry	4
Economics	4
Human Rights	4
Science	4
Architecture	3
Art	3
Business Law	3
Industrial Design	3
Accounting	2
‡Bio Med	2
‡Chemistry	2
Ethology	2
Finance	2
Global and International Studies	2
Anthropology	1
Arts	1
Athletic Training	1
‡Biotechnology	1
Earth Science	1
Environmental Studies	1
Food Science and Nutrition	1
General Studies	1
Geomatics	1
Information Technology and Networking Applications	1

Interactive Multimedia & Design	1
Music	1
Undeclared	1
Video Game Development	1

Note: ‡ Natural science majors.

Science Self-Reports

When asked whether or not participants would self-identify as a scientist, only 11% of psychology students said "yes", whereas 57% of natural science students said "yes". Furthermore, when asked whether they believed their field to be scientific, 86 psychology students said "yes", whereas 13 of them said "no". Comparatively, all 30 natural science students reported that they believed their discipline to be scientific.

Scientific Literacy

Four hundred and seventy-seven participants completed the Scientific Literacy Questionnaire, which comprised three parts (Knowledge of Topics, Knowledge of Methodologies, and Attitude Toward Science). To evaluate the construct validity of the Knowledge of Topics and Knowledge of Methodologies sections of the Scientific Literacy Questionnaire, internal consistency was measured using Crohnbach's alpha. These sections of the questionnaire were found to be reliable (28 items, $\alpha = .74$). The total score per participant was calculated using the average of scores from the Topics and Methods sub-sections ($M = .70$, $SD = .15$). Table 5 shows the mean scores per question for the Topics portion of the questionnaire. While participants typically correctly answered questions from the natural sciences fairly well, they seem to have struggled more with the questions about psychology. For instance, 38 percent of participants thought that "human memory works like a video or tape recorder", 46 percent of participants thought that "most people use only 10% of their brain's processing capacity", and 52 percent of participants thought that "opposites attract: people are typically attracted to partners who differ from them". This suggests that participants might not have the same knowledge of psychological findings as they do findings from natural sciences. Typically, participants scored higher on the topics portion of the questionnaire ($M = .73$, $SD = .16$) than on the methods section ($M = .67$, $SD = .19$). Table 6 shows the mean scores per question for the Methods portion of the questionnaire. Table 7 shows the proportion of participants who agreed with each of the statements shown to them in the Attitude Toward Science portion of the Scientific Literacy Questionnaire. While one question suggested once more that the participants had misconceptions about research in psychology (80% of them agreed that "[t]heories founded in psychology can be attributed to common sense"), the open-ended nature of most questions made them difficult to interpret in relation to the other aspects of the present study. Therefore, this portion of the questionnaire was not analyzed further.

Table 5

Mean Scores for the Topics Sub-Section of the Scientific Literacy Questionnaire

Question	Mean accuracy
Hot air rises.	.93
Sunlight can cause skin cancer.	.90
The oxygen that we breathe comes from plants.	.90
Light travels faster than sound.	.88
Radioactive milk can be made safe by boiling it.	.86
The continents on which we live have been moving apart for millions of years, and will continue to move in the future.	.86
The psychiatric disorder known as autism is caused by prior exposure to mercury-based vaccines.	.78
The earliest humans lived at the same time as the dinosaurs.	.78
The universe began with a huge explosion.	.72
Electrons are smaller than atoms.	.71
The liver makes urine.	.69
Lasers work by focusing sound waves.	.64
Human memory works like a video or tape recorder.	.62
On average, it takes 28 days for the earth to make a full orbit around the sun.	.60
Most people use only 10% of their brain's processing capacity.	.54
Opposites attract: people are typically attracted to partners who differ from them.	.48
Antibiotics kill viruses as well as bacteria.	.44

Note: Questions are listed by accuracy in descending order.

Table 6

Mean Scores for the Methods Sub-Section of the Scientific Literacy Questionnaire

Question	Mean accuracy
Mary conducts analyses using a statistical software program and finds that the rising incidence of divorce has a strong relationship with the rising gas prices. Mary can now conclude that divorce is caused by an increase in gas prices.	.87
Susan has noticed that none of the people in her life who smoke have suffered cancer. Instead, she notes that everyone she knows who has suffered the disease, was a non-smoker. Susan is right to conclude that smoking does not cause cancer, regardless of contradictory scientific findings.	.84
A doctor tells a couple that they have a one in four chance of having a child with an illness. Does this mean that, If they have only three children, none will have the illness? If their first child has the illness, the next three will not? Each of the couple’s children will have the same risk of suffering the illness? If the first three children are healthy, the fourth will have the illness?	.81
When scientists discuss hypotheses, scientists are talking about: A hunch or idea A well-established explanation A proven fact	.75
Your favorite hockey player has not scored a goal over the last nine games. If it is assumed that he has a 50:50 chance of either scoring a goal or not in each game, it can be concluded that there is an increased likelihood that he will score a goal in the next game.	.73
When scientists talk about Einstein’s theory of relativity, scientists are talking about: A hunch or idea A well-established explanation A proven fact	.65

Suppose a drug used to treat high blood pressure is suspected of not working well. The following is a list of three different ways scientists might use to investigate the problem. Which one do you think scientists would be most likely to use? Talk to patients to get their opinions Use their knowledge of medicine to decide how good the drug is Give the drug to some patients by not to others. Then compare what happens to each group.	.65
A company has developed a diet pill that helps people feel less hungry. To support the statement that this pill leads people to lose weight, one hundred people are asked to take it daily and to follow a diet that reduces calorie intake by 20%. At the end of one month, 88 people in the sample out of 100 lost 5 or more pounds. Hence, the company claimed that the pill had worked as intended. Would scientists believe that this experiment had produced strong support for efficacy of this weight loss pill? (Yes/No)	.62
When scientists talk about Newton's First Law, scientists are talking about: A hunch or idea A well-established explanation A proven fact	.59
Scientists tend to weigh evidence in support of a theory more strongly than evidence produced against it.	.54
Dr. Albert has recruited participants for his study on the effects of having a pet on Post Traumatic Stress Disorder (PTSD). Eleven people took part in the experiment, three of which suffered from PTSD. One of the participants with PTSD already had a dog and one had a pet fish. Dr. Albert found that the participants with pets were less likely to experience a high physiological stress response to trauma-related cues. Dr. Albert is right in concluding that having a pet has positive therapeutic effects on PTSD.	.34

Note: Questions are listed by accuracy in descending order.

Table 7

Mean Scores for the Attitude Toward Science Sub-Section of the Scientific Literacy Questionnaire

Statement	Proportion Agreed
Scientists should take responsibility to the bad effects of their theories and inventions.	.91
Natural vitamins are better for you than laboratory-made ones.	.89
There are phenomena that physical science and the laws of nature cannot explain.	.89
Theories founded in psychology can be attributed to common sense.	.80
The positions of the planets have an influence on the events of everyday life.	.63
All of today's scientific theories will still be accepted in a hundred years' time.	.61
Some numbers are especially lucky for some people.	.61
UFOs are real and should be investigated.	.58
Some ancient civilizations were visited by extraterrestrials.	.57
We should devote more of our money and scientific resources to repair damage done to the environment.	.57
Faith healing is a valid alternative to conventional medicine.	.56
Some people possess psychic powers.	.51
Computers will eventually be intelligent enough to think like humans.	.41
Science will come up with a way to dispose of toxic waste.	.37
We should make a concerted effort to search for life on other planets.	.31
The government should strongly support the manned space program.	.29
Pure science should be funded regardless of its lack of immediate benefit to society.	.27
Genetic engineering is a good idea.	.24
Nuclear power is an important energy source and its use should be expanded.	.23
Scientists should be allowed to do research that causes pain to animals, if it helps solve human health problems.	.17

Free Association

Data Cleaning and Screening

Free Association responses were screened following Nelson et al.'s (2004) methodology. Before cleaning, the total number of associates was 14,819. All obvious typos (e.g., meuroscience, sychology, studie) and abbreviations (e.g., "neur", "chem", "math", "dino") were corrected and all tenses were changed to the present tense (i.e., eliminating "ing" and "ed"), unless doing so changed the meaning of the word (e.g., "building" was not changed to "build"). Terms with American spelling (e.g., color, behavior, favorite) were changed to Canadian spelling (e.g., colour, behaviour, and favourite). All classifiers were removed and the root word was kept (e.g., "a", "the", "is", and any adverbs or adjectives). All strings (i.e., responses with more than two words that are not separated by any delimiter) and nonsense words (e.g., "sdgdsfg" and "science is about…") were removed (1.22%). All obviously personal responses (e.g., "mom", "boyfriend", and "Georgette") were eliminated (.45%). All synonyms were collapsed (e.g., "unsure", "I don't know" and "no idea"; "hard" and "difficult"; "smart" and "intelligent"; "neurology" and "neuroscience"; "penitentiary", "prison" and "jail"; and "essential", "needed" and "necessary") where the more frequent term was chosen (i.e., "intelligent", "difficult", "neuroscience", "cognition", "jail", "unsure", and "necessary") (2.21%). All responses with more than one word, separated by any delimiter (e.g., a comma or backslash) were altered, where the first word was kept, unless doing so changed the meaning of the word (e.g., "mental illness") (.013%). Finally, all responses that were identical to the cue were removed (.27%). After cleaning, the total number of associates was 14,528. Thus, in total, 98% of associates remained in the analyses.

Semantic Strength

There are various methodologies for analyzing and interpreting word association data (Nelson et al., 2004). However, the strength between two cue words (OSG) and the cue to associate strength (FSG) were the primary focus in this present study. Semantic strength is calculated using the word associates generated by participants for each cue. In order to be considered a word associate, the target associate must have been generated by at least two participants. Therefore, idiosyncratic responses (i.e., terms generated by only one participant) were not analyzed. Overall semantic strength between cue words was measured using OSG values, where larger values represent more similar semantic networks surrounding the cue words. These semantic networks comprised associate words that were generated by participants. Within each individual cue word's semantic network, cue to associate semantic strength was measured using FSG values. Thus, FSG values were used to investigate the individual semantic networks for each cue word. OSG and FSG values will be used to compare semantic networks for multiple sub-populations as well.

OSG. It was hypothesized that if the perception of psychology as unscientific is rooted in individuals' implicit perception of the discipline, the overall semantic strength between science and the natural sciences would be stronger than that between science and psychology. Moreover, the overall semantic strength between each of the natural sciences would be stronger than that between psychology and any of the natural sciences. The results of this present study provide evidence to support this hypothesis. The overall semantic strength between any two cues was measured by OSG values. OSG was calculated by summing the cross-multiplications of the overlapping associates' FSG values between two target cues (M = .0066, range: <.0001 to

.4344). For instance, the cues *psychology* and *science* generated 15 common associates. The product FSG (pFSG) for each of the common associates is calculated and these values are then summed to create the value that represents semantic strength between the two cue words (i.e., OSG = .0047). OSG values for all cues of interest are shown in Table 8. The semantic strength between science and both chemistry and physics is stronger than that of science and psychology. Moreover, while the semantic strength between neuroscience and both chemistry and physics is low, neuroscience is semantically associated to science with the same strength as physics.

Table 8

OSGs for Main Cues of Interest

	Science	Neuroscience	Biology	Chemistry	Physics
Psychology	.0047	.1652†	.0039	.0014	.0014
Science		.0106†	.0036	.0154†	.0106†
Neuroscience			.0096†	.0022	.0032
Biology				.0027	.0034
Chemistry					.0097†

Note: † OSG values above the mean (M = .0066).

To support this point further, Table 9 shows the rank order of the OSG means for all cues. The cue *psychology* falls below the mean for the cue *science* and all the natural science cues. Moreover, while neuroscience is more strongly associated with the cue *psychology* than psychology with itself, neuroscience also has one of the strongest OSG values for science (only after science, chemistry, and physics). Furthermore, science and biology both appear above the OSG mean for neuroscience, whereas the only cue of interest above the OSG mean for psychology is itself and neuroscience.

Table 9

Rank Order of Cues' OSG Values Per Cue of Interest

Science	Chemistry	Biology	Physics	Neuroscience	Psychology
Science	*Chemistry*	*Biology*	*Physics*	Neuroscience	Neuroscience
Chemistry	**Science**	Neuroscience	Statistics	***Psychology***	***Psychology***
Physics	*Physics*	Agriculture	Engineering	Psychiatry	Psychiatry
Neuroscience	Engineering	Anthropology	Mathematics	**Science**	Philosophy
Engineering	Mathematics	Humanities	Economics	*Biology*	Anthropology
Statistics	*Biology*	***Psychology***	**Science**	Anthropology	**Science**
Computing	Statistics	**Science**	*Chemistry*	*Physics*	*Biology*
Psychology	Computing	*Physics*	Computing	*Chemistry*	Criminology
Astronomy	Neuroscience	Medicine	Astronomy	Engineering	Sociology
Mathematics	***Psychology***	*Chemistry*	*Biology*	Medicine	Medicine
Biology	Economics	Philosophy	Neuroscience	Mathematics	Humanities
Economics	Humanities	Psychiatry	Criminology	Computing	Theology
Psychiatry	Psychiatry	Sociology	Architecture	Agriculture	*Chemistry*
Medicine	Architecture	Engineering	***Psychology***	Philosophy	*Physics*
Theology	Medicine	Computing	Humanities	Criminology	Engineering
Philosophy	Business	Theology	Theology	Humanities	Computing
Geography	Anthropology	Music	Agriculture	Statistics	History
Architecture	Sociology	Mathematics	Anthropology	Sociology	Law
Law	Astronomy	History	Geography	Architecture	Economics
History	Agriculture	Astronomy	Sociology	Astronomy	Astronomy
Agriculture	Theology	Archaeology	Law	Economics	Mathematics
Anthropology	Law	Economics	Philosophy	Theology	Architecture
Criminology	Linguistics	Architecture	Medicine	Law	Archaeology
Humanities	Criminology	Criminology	Linguistics	History	Linguistics
Linguistics	History	Statistics	Psychiatry	Linguistics	Geography
Sociology	Archaeology	Linguistics	Business	Archaeology	Art
Business	Art	Business	History	Art	Statistics
Archaeology	Geography	Law	Art	Business	Agriculture
Music	Music	Art	Archaeology	Geography	Business
Art	Philosophy	Geography	Music	Music	Music

Note: The natural science cues are italicized, the cue Science is bolded, the cue Neuroscience is underlined, and the cue Psychology is bold, italicized, and underlined. The dotted lines represent the OSG mean for each cue.

Note that the semantic strength between biology and science is actually lower than that of psychology and science. Thus, a similar argument could be made for biology; that is, the implicit perception of the discipline is that it is not scientific. In order to examine this possibility, the semantic associative networks for each cue were investigated.

FSG. FSG is calculated by the number of participants who responded with a target associate given a target cue relative to how many participants responded to the target cue (*M* = .0208, range: <.0001 to .6561). For instance, since 487 participants responded to the target cue *psychology* and 7 of them responded with the target associate *science*, the FSG for *science* to *psychology* is .0144. The number of times *science* was generated as an associate was calculated for each cue (*M* = .0137, range = .0021 to .0690). Table 10 shows that all of the cues of interest (except the cue science) included the target associate science. However, with regard to the target associate science, the FSG of the cue psychology was comparatively lower (.0144) than those of the natural sciences and *neuroscience*. To further illustrate this point, Table 11 demonstrates how many times any cue word was generated as an associate when participants were shown the cue science (*M* = .0298, range = .0021 to .1084). When shown *science*, 53 participants thought of the term biology, but not one generated psychology. Meanwhile, when participants saw the cue science, the first word that came to mind included other disciplines, such as *medicine* and *philosophy*.

Table 10

FSG for the Target Associate *Science* Per Cue

CUE	Frequency Count	Sample Size per Cue	FSG
Physics	34	493	.0690
Chemistry	28	489	.0573
Biology	17	489	.0348
Computing	12	482	.0249
Neuroscience	12	474	.0253
Engineering	8	476	.0168
Humanities	7	484	.0145
Psychology	7	487	.0144
Anthropology	4	476	.0084
Astronomy	4	491	.0081
Sociology	4	481	.0083
Agriculture	2	488	.0041
Economics	2	485	.0041
Mathematics	2	481	.0042
Psychiatry	2	480	.0042
Archaeology	1	479	.0021
Art	1	489	.0020
Law	1	484	.0021
Linguistics	1	485	.0021
Medicine	1	490	.0020
Philosophy	1	481	.0021
Statistics	1	471	.0021
Theology	1	477	.0021

Note: Cues are listed in order of FSG from strongest to weakest

Table 11

FSG for the Cue Science and the Target Associates of Interest

Target Associate	Frequency	Sample Size for the Cue Science	FSG
Biology	53	492	.1077
Chemistry	42	492	.0854
Mathematics	14	492	.0285
Physics	9	492	.0183
Medicine	6	492	.0122
Neuroscience	3	492	.0061
Engineering	2	492	.0041
Astronomy	1	492	.0020
Philosophy	1	492	.0020

Note: Cues are listed in order of FSG from strongest to weakest

So, while the associate science is part of the semantic network for the word psychology, the associate psychology is not part of the semantic network for the word science. Table 12 lists the associates for *science* and *psychology*, in turn, along with their FSGs (see Appendix B for a list of all associates for all cues). While the overall semantic strengths between *science* and both psychology and biology were low, the associates that had the largest impact on science were "biology" (.1077) and "chemistry" (.0854). The associates that had the largest impact on psychology were "mind" (.2710) and "brain" (.2382). The associate brain was also part of the semantic network for the cue science. However, "mind" was not.

Table 12

Associates' FSGs for Science and Psychology

CUE	Associates	Frequency Count	Sample Size per Cue	FSG
SCIENCE	Biology	53	492	.1077
SCIENCE	Chemistry	42	492	.0854
SCIENCE	Intelligent	34	492	.0691
SCIENCE	Lab	34	492	.0691
SCIENCE	Difficult	19	492	.0386
SCIENCE	Chemical	18	492	.0366
SCIENCE	Experiment	17	492	.0346
SCIENCE	Mathematics	14	492	.0285
SCIENCE	Technology	12	492	.0244
SCIENCE	Knowledge	10	492	.0203
SCIENCE	Research	10	492	.0203
SCIENCE	Physics	9	492	.0183
SCIENCE	Fact	8	492	.0163
SCIENCE	Discovery	7	492	.0142
SCIENCE	Interesting	7	492	.0142
SCIENCE	Space	7	492	.0142
SCIENCE	Brain	6	492	.0122
SCIENCE	Earth	6	492	.0122
SCIENCE	Medicine	6	492	.0122
SCIENCE	Beaker	5	492	.0102
SCIENCE	Einstein	5	492	.0102
SCIENCE	Computer	4	492	.0081
SCIENCE	Future	4	492	.0081
SCIENCE	Logic	4	492	.0081
SCIENCE	Nature	4	492	.0081
SCIENCE	Nerd	4	492	.0081
SCIENCE	Theory	4	492	.0081
SCIENCE	Academic	3	492	.0061
SCIENCE	Bill Nye	3	492	.0061
SCIENCE	Boring	3	492	.0061
SCIENCE	Complex	3	492	.0061
SCIENCE	Fiction	3	492	.0061
SCIENCE	Life	3	492	.0061

SCIENCE	Major	3	492	.0061
SCIENCE	Neuroscience	3	492	.0061
SCIENCE	Progress	3	492	.0061
SCIENCE	Think	3	492	.0061
SCIENCE	Universe	3	492	.0061
SCIENCE	Animal	2	492	.0041
SCIENCE	Atom	2	492	.0041
SCIENCE	Body	2	492	.0041
SCIENCE	Discipline	2	492	.0041
SCIENCE	Doctor	2	492	.0041
SCIENCE	Engineering	2	492	.0041
SCIENCE	Explore	2	492	.0041
SCIENCE	Fascinating	2	492	.0041
SCIENCE	Learn	2	492	.0041
SCIENCE	Microscope	2	492	.0041
SCIENCE	Molecule	2	492	.0041
SCIENCE	Neuron	2	492	.0041
SCIENCE	Planet	2	492	.0041
SCIENCE	Project	2	492	.0041
SCIENCE	School	2	492	.0041
SCIENCE	Scientist	2	492	.0041
SCIENCE	Study	2	492	.0041
SCIENCE	Test Tube	2	492	.0041
SCIENCE	Truth	2	492	.0041
PSYCHOLOGY	Mind	132	487	.2710
PSYCHOLOGY	Brain	116	487	.2382
PSYCHOLOGY	Behaviour	17	487	.0349
PSYCHOLOGY	Interesting	11	487	.0226
PSYCHOLOGY	Freud	8	487	.0164
PSYCHOLOGY	Study	8	487	.0164
PSYCHOLOGY	Think	8	487	.0164
PSYCHOLOGY	Science	7	487	.0144
PSYCHOLOGY	Experiment	6	487	.0123
PSYCHOLOGY	People	6	487	.0123
PSYCHOLOGY	Class	5	487	.0103
PSYCHOLOGY	Intelligent	5	487	.0103
PSYCHOLOGY	Major	5	487	.0103
PSYCHOLOGY	Mental	5	487	.0103

PSYCHOLOGY	Mental Health	5	487	.0103
PSYCHOLOGY	Cognition	4	487	.0082
PSYCHOLOGY	Complex	4	487	.0082
PSYCHOLOGY	Doctor	4	487	.0082
PSYCHOLOGY	School	4	487	.0082
PSYCHOLOGY	Thought	4	487	.0082
PSYCHOLOGY	Understanding	4	487	.0082
PSYCHOLOGY	Learn	3	487	.0062
PSYCHOLOGY	Personality	3	487	.0062
PSYCHOLOGY	Psychologist	3	487	.0062
PSYCHOLOGY	Theory	3	487	.0062
PSYCHOLOGY	Therapist	3	487	.0062
PSYCHOLOGY	Answer	2	487	.0041
PSYCHOLOGY	Boring	2	487	.0041
PSYCHOLOGY	Confusing	2	487	.0041
PSYCHOLOGY	Curiosity	2	487	.0041
PSYCHOLOGY	Easy	2	487	.0041
PSYCHOLOGY	Feeling	2	487	.0041
PSYCHOLOGY	Human	2	487	.0041
PSYCHOLOGY	Intuitive	2	487	.0041
PSYCHOLOGY	Mental Illness	2	487	.0041
PSYCHOLOGY	Mystery	2	487	.0041
PSYCHOLOGY	Necessary	2	487	.0041
PSYCHOLOGY	Neuroscience	2	487	.0041
PSYCHOLOGY	Observant	2	487	.0041
PSYCHOLOGY	Online	2	487	.0041
PSYCHOLOGY	Research	2	487	.0041
PSYCHOLOGY	Test	2	487	.0041
PSYCHOLOGY	Textbook	2	487	.0041
PSYCHOLOGY	Therapy	2	487	.0041

Note: All associates are listed in order from strongest FSG to weakest.

Types of Associates Generated

Krull and Silvera (2013) and Morgan (2015) provided evidence to suggest that science is misconceived of as the topics and objects of study rather than the methodologies by which it is studied. Thus, it was hypothesized that, if science is conceived of as the topics and objects of study, the cue science should have elicited topic and object associates more frequently than methodological terminology. Moreover, the common associates elicited for the cues science and psychology should have comprised methodological terminology. Finally, the topic and object associates generated for science and the natural sciences should have been similar to each other and different from those generated for psychology. The results of this present study provide evidence to support these hypotheses.

Specifically, associates were coded for semantics (i.e., topic, object, method, or other). Table 13 shows that, when participants were shown the cues *science* and *psychology*, they were more likely to generate topics as associates than methodological terminology. For the cue *science*, 167 associates were topics (e.g., *biology* and *chemistry*) and 66 were method terms (e.g., *experiment* and *research*). For the cue *psychology*, 305 associates were topics (e.g., *mind* and *brain*) and 44 were method terms (e.g., *study* and *science*). However, the cue *science* elicited more object associates than the cue *psychology*. For the cue *science*, 77 participants generated object associates such as *lab* and *chemical*. Meanwhile, for the cue *psychology*, 2 participants generated the object associate *textbook* (See Appendix C for a full list of coded semantics for psychology and science).

Table 13

Number of Types of Associates Generated for Science and Psychology

Cue	Topics	Objects	Methods	Other
Science	167 (39%)	77 (18%)	66 (16%)	114 (27%)
Psychology	305 (73%)	2 (0%)	44 (11%)	68 (16%)

Table 14 is a list of the common associates for the cues *psychology* and *science* and their respective pFSG values. These pFSG values were calculated by multiplying the science FSG and psychology FSG values per associate. pFSG values are those that are summed to create the OSG value. Therefore, the higher the associate's pFSG value, the more impact that associate has on the overall semantic strength between the two cue words. When examining the common associates for psychology and science, none of them included object associates and the only two topic associates that were common between the disciplines were *brain* and *neuroscience*. However, similar to Morgan (2015), 4 of the 15 common expressions for psychology and science included words that exemplify methodologies common to scientific disciplines (i.e., *experiment*, *theory*, *research*, and *study*). Conversely, of the other cues of interest, the majority of common associates between them and *science* were topic and object terminologies (see Table 15).

Table 14

The Associates Common to *Science* and *Psychology*

Common Associates	Frequency Count for *Science*	*Science* FSG	Frequency Count for *Psychology*	*Psychology* FSG	*Science* and *Psychology* PFSG
Brain	6	.0122	116	.2382	.0029
Intelligent	34	.0691	5	.0103	.0007
Experiment	17	.0346	6	.0123	.0004
Interesting	7	.0142	11	.0226	.0003
Think	3	.0061	8	.0164	.0001
Research	10	.0203	2	.0041	.0001
Study	2	.0041	8	.0164	.0001
Major	3	.0061	5	.0103	.0001
Theory	4	.0081	3	.0062	.0001
Complex	3	.0061	4	.0082	.0001
Doctor	2	.0041	4	.0082	.0000
School	2	.0041	4	.0082	.0000
Learn	2	.0041	3	.0062	.0000
Boring	3	.0061	2	.0041	.0000
Neuroscience	3	.0061	2	.0041	.0000

Note: Associates are listed according to the *Science* and *Psychology*'s pFSG in descending order.

Table 15

Proportion of Types of Common Associates Generated for *Science* and Other Cues

Type	Physics	Chemistry	Biology	Neuroscience	Psychology
Topic	.09	.21	.54	.40	.13
Object	.18	.29	.08	.00	.00
Method	.09	.14	.08	.00	.27
Other	.64	.36	.30	.60	.60
Total:	*11*	*14*	*13*	*10*	*15*

Note: Proportions are based off the number of common associates between the cue pairings, regardless of frequency count per associate.

Upon further investigation into which types of associates were generated for the cues of interest, two key differences were noted. First, it may be sadly observed that the FSG for the associate *Freud* to the cue *psychology* (.0164) was greater than that of the associate *Einstein* to the cue *science* (.0102). Second, the number of times *difficult* was generated as an associate was calculated for each cue. The only cue of interest that did not have the target associate *difficult* was *psychology*.

So far the results of this present study have provided evidence to support the notion that the perception of psychology as unscientific is rooted in individuals' implicit perception of the discipline. Moreover, these results have also provided evidence to support the claim that science is implicitly perceived of as the topic and object of study rather than the methods by which it is studied. However, in order to examine whether a dual-processing account of cognition can assist in explaining the cognitive mechanisms underlying psychology's perception as unscientific, individuals' explicit perception of the discipline must be compared to their implicit perception.

Explicit Perception: "Is Psychology a Science?"

Four hundred and eighty-three participants responded to the question "Is psychology a science" at three separate intervals (i.e., before and after explaining their reasoning, and again after having to define the term science). In total, 8 percent of participants changed their answer at any given interval. Since the participants' responses were mostly consistent, final responses comprised the highest frequency response. Four hundred and forty-three participants said that "yes" psychology was a science, whereas only thirty-five participants said "no". Similar analyses were run, using either the first, second, or third answer, and no impact on the results was found.

Comparing Sub-Populations

It was hypothesized that if psychology's perception as unscientific can be explained by a dual-processing account of cognition, the explicit belief of psychology as scientific should not affect the implicit perception of psychology as unscientific. Furthermore, while psychology-specific education and scientific literacy should impact participants' willingness to categorize psychology as a science, it should not affect their implicit perception (i.e., the semantic relatedness between psychology, science, and the natural sciences). Thus, multiple sub-populations' explicit perceptions of whether or not psychology is a science were compared. Moreover, their semantic associative networks were compared based on level of psychology-specific education (i.e., current year standing and program major) and scientific literacy scores.

Differences Based on Psychology-Specific Education

One hundred percent of psychology majors said that "yes" psychology is a science, whereas 87 percent of natural science majors said that "yes" psychology is a science. Thus, it is possible that psychology-specific education might mediate individuals' explicit perception of psychology as a science.

In order to examine the differences in semantic networks based on psychology-specific education, sub-populations included upper year psychology students (*n* = 62), upper year non-psychology students (*n* = 144), and first year students who are currently enrolled in a psychology course (*n* = 256). Overall, free association results were fairly consistent across all sub-populations. A few exceptions were observed, however. For instance, for first year students (see Table 16), the OSG between psychology and science was considerably lower (.0012) than that of the entire dataset. Moreover, OSG values for psychology and science were above the mean for both upper year psychology students (.0065) (see Table 17) and upper year non-psychology students (.0088) (see Table 18). Finally, when types of associates were examined, one key difference amongst sub-populations was noted; that is, the associate Freud was not generated by any of the upper year psychology student. Moreover, the upper year non-psychology students generated the term Freud when they saw the cue psychology more often than any other sub-population. However, first year students were more likely to say science when they saw psychology than either of the upper year groups. In fact, no participant in either upper year groups generated the term science when they saw the cue psychology.

Table 16

OSGs for Main Cues of Interest for First Year Students

	Science	Neuroscience	Biology	Chemistry	Physics
Psychology	.0012	.1720†	.0047	.0020	.0018
Science		.0013	.0009	.0150†	.0094†
Neuroscience			.0110†	.0020	.0027
Biology				.0021	.0018
Chemistry					.0085†

Note: † OSG values above the mean (*M* = .0064, *n* = 256).

Table 17

OSGs for Main Cues of Interest for Upper Year Psychology Students

	Science	Neuroscience	Biology	Chemistry	Physics
Psychology	.0065†	.1246†	.0000	.0000	.0000
Science		.0275†	.0059†	.0156†	.0174†
Neuroscience			.0000	.0063†	.0074†
Biology				.0016	.0000
Chemistry					.0109†

Note: † OSG values above the mean (*M* = .0058, *n* = 62).

Table 18

OSGs for Main Cues of Interest for Upper Year Non-Psychology Students

	Science	Neuroscience	Biology	Chemistry	Physics
Psychology	.0088†	.1717†	.0000	.0010	.0000
Science		.0203†	.0023	.0126†	.0115†
Neuroscience			.0018	.0018	.0028
Biology				.0024	.0038
Chemistry					.0098†

Note: † OSG values above the mean (*M* = .0067, *n* = 144).

Differences Based on Scientific Literacy

A median split was conducted on combined mean scores for the Topics and Methods portions of the Scientific Literacy Questionnaire in order to compare the implicit and explicit perception of psychology. This manipulation yielded a group with above median scores ($n = 251$, $M = .83$) and another with below median scores ($n = 227$, $M = .57$), which were statistically different, $t(475) = 32.74$, $p < .001$. The OSGs for two groups appear in Tables 19 and 20, respectively. The OSG values that are above the OSG mean for that group are similar for both populations. Only one exception is to be noted: The semantic strength between *biology* and *neuroscience* is stronger for below median group than for the above median one. When comparing these sub-populations to the results of the entire dataset (Table 8), it can be seen that the strength between *psychology* and the natural sciences is lower for those with high literacy scores. Moreover, the strength between *psychology* and *biology* and between *biology* and *science* is higher for those with low literacy scores.

Table 19

Above median OSGs for Main Cues of Interest

	Science	Neuroscience	Biology	Chemistry	Physics
Psychology	.0050	.1726†	.0007	.0009	.0011
Science		.0105†	.0014	.0119†	.0132†
Neuroscience			.0005	.0012	.0022
Biology				.0014	.0021
Chemistry					.0092†

Note: † OSG values above the mean ($M = .0063$).

Table 20

Below median OSGs for Main Cues of Interest

	Science	Neuroscience	Biology	Chemistry	Physics
Psychology	.0046	.1553†	.0050	.0018	.0018
Science		.0112†	.0049	.0181†	.0075†
Neuroscience			.0145†	.0038	.0053
Biology				.0039	.0044
Chemistry					.0089†

Note: † OSG values above the mean (M = .0068).

Other differences between these groups' semantic networks were found in the types of associates that were generated (see Appendix D for data tables). For instance, when presented with the cue *neuroscience*, the below median group was more likely to generate the target associate *science* than the above median group. Furthermore, it was less likely to generate methodology associates for the cue *science*. Unfortunately, the difference between the FSGs for Freud to psychology (.0247) and Einstein to science (.0080) was amplified for the above median group. Moreover, the below median group demonstrated a weaker association between Freud and psychology (.0090) compared to its association between Einstein and science (.0136). Finally, the score on the scientific literacy questionnaire did not affect participants' willingness to agree that "yes" psychology is a science (92 percent of low scorers and 93 percent of high scorers said "yes").

Dimension Ratings

Another method that was used to measure individuals' explicit perception of psychology as a science was a ratings task. Thus, it was hypothesized that if the perception of psychology as unscientific can be explained by implicit reasoning errors, then scientific ratings for psychology should be relatively high. However, ratings for psychology on any dimension that might predict scientific ratings should be low compared to the other cues of interest. Thus, the ratings for the 488 participants who completed the ratings portion of the study were analyzed. The mean score for each dimension (i.e., importance, concreteness, imageable, difficult, specific, and scientific) was calculated for each cue word. The data are shown in Table 21. Psychology was ranked below the mean on all dimensions excluding Scientific and Important. However, for the *scientific* dimension, the five other science cues (i.e., *science, chemistry, biology, neuroscience,* and *physics*) ranked within the first five positions, whereas the cue *psychology* was 10^{th} appearing after disciplines such as *psychiatry* and *medicine*.

Dimension Ratings and Semantic Strength: Correlations

Table 22 shows the correlations between the dimension ratings across all cues. As expected, the correlation between ratings of scientific and difficulty were high ($r = .79$, $p < .001$). However, the correlations between ratings of scientific and all other dimensions (excluding imageability) all reached at least a .01 level of significance.

Table 21

Mean Ratings Per Cue

Cue	Scientific	Important	Difficult	Concrete	Imageable	Specific
Science	4.84	4.44	4.21	3.80	3.45	2.96
Chemistry	4.78	4.03	4.31	3.97	3.62	3.67
Neuroscience	4.71	4.18	4.32	3.57	3.36	3.97
Biology	4.70	4.27	3.98	4.07	3.73	3.57
Physics	4.70	3.95	4.45	3.59	3.06	3.56
Medicine	4.67	4.65	4.58	4.18	3.93	3.75
Engineering	4.11	4.31	4.48	3.95	3.35	3.41
Astronomy	4.00	3.06	3.50	3.31	3.76	3.41
Psychiatry	3.68	3.82	3.57	2.87	3.07	3.38
Psychology	3.63	3.96	3.11	2.78	3.30	2.97
Mathematics	3.43	3.93	4.26	3.26	3.38	3.34
Computing	3.41	3.72	3.75	3.47	3.25	3.44
Agriculture	3.08	3.92	2.79	3.99	3.78	3.26
Statistics	2.99	3.48	3.71	3.02	2.98	3.62
Archaeology	2.97	2.92	3.10	3.69	3.53	3.28
Architecture	2.94	3.82	3.78	3.97	4.03	3.63
Geography	2.80	3.33	2.70	3.71	3.72	3.24
Criminology	2.60	3.81	3.15	2.90	3.20	3.23
Anthropology	2.60	2.89	2.61	2.80	2.77	2.79
Economics	2.47	3.70	3.49	2.87	2.69	3.14
Sociology	2.47	3.27	2.53	2.52	2.79	2.64
Linguistics	2.20	3.27	3.06	2.76	2.66	3.21
Business	2.10	3.88	3.34	3.01	3.38	2.97
Law	2.05	4.31	3.77	3.01	3.44	3.40
Humanities	2.03	3.19	2.58	2.45	2.48	2.41
Philosophy	1.95	2.70	2.86	2.00	2.58	2.37
Theology	1.88	2.45	2.54	2.05	2.39	2.50
History	1.81	3.36	2.66	2.83	3.41	2.80
Music	1.67	3.34	2.65	3.06	3.99	2.74
Art	1.59	3.14	2.55	3.11	4.23	2.24
M	***3.10***	***3.64***	***3.41***	***3.22***	***3.31***	***3.16***
SD	***1.07***	***.55***	***.69***	***.59***	***.49***	***.44***

Note: Cues are sorted based on Scientific rating scores.

Table 22

Correlations Among Dimensions

Dimensions	1	2	3	4	5
1. Scientific					
2. Important	.66				
3. Difficult	.79	.80			
4. Concrete	.66	.61	.65		
5. Imageable	.20	.35	.24	.75	
6. Specific	.74	.62	.84	.71	.33

Note: Correlations greater than .37 are significant at the .05 level, two tailed; Correlations greater than .47 are significant at the .01 level, two tailed

Regression Analysis

The next step in analyzing the dimensions was to run a forward stepwise regression to provide a more in-depth understanding of the relationship between the dimensions. This was done in order to determine which of the remaining five dimensions would best predict the explicit perception of any discipline as scientific. The criterion variable used in this regression analysis was the mean participant ratings for the dimension *scientific* per discipline. The predictor variables used were *importance*, *concreteness*, *specificity*, *difficulty*, and *imageability*. Table 23 shows that *difficulty* was found to be the strongest predictor of *scientific* ratings $F(1, 28) = 56.60$, $p < .001$. Moreover, the only other predictor variable that explained enough variance to be entered into the model was *concreteness* $F(2, 27) = 34.941$, $p < .001$.

Since the dimensions *difficulty* and *concreteness* were found to be the two dimensions that best predicted the participants' ratings of how scientific a discipline is thought to have been, the rank order placement of the cues of interest within both of these dimensions was examined (see Table 24). It was found that, while all of the cues of interest, including neuroscience, ranked above the median for both concreteness and difficulty, psychology ranked below the median for both of these dimensions.

Table 23

Forward Stepwise Regression of Dimension Ratings on Scientific Ratings

Variable	R	R^2 change	F change	Final β	Final F
1. Difficulty[a]	.82	.67	56.60***	.82	56.60***
2. Difficulty	.82	.67	5.07**	.63	34.94***
Concreteness[b]	.85	.72		.30	

Note: *** $p < .001$, ** $p < .05$
[a] $df = 1, 28$. [b] $df = 2, 27$

Table 24

Dimension Rating Rank Order Per Cue

Scientific	Concreteness	Difficulty	Importance	Imageability	Specificity
Science	Medicine	Medicine	Medicine	Art	Neuroscience
Chemistry	*Biology*	Engineering	**Science**	Architecture	Medicine
Neuroscience	Agriculture	*Physics*	Law	Music	*Chemistry*
Biology	*Chemistry*	Neuroscience	Engineering	Medicine	Architecture
Physics	Architecture	*Chemistry*	*Biology*	Agriculture	Statistics
Medicine	Engineering	Mathematics	Neuroscience	Astronomy	*Biology*
Engineering	**Science**	**Science**	*Chemistry*	*Biology*	*Physics*
Astronomy	Geography	*Biology*	***Psychology***	Geography	Computing
Psychiatry	Archaeology	Architecture	*Physics*	*Chemistry*	Astronomy
Psychology	*Physics*	Law	Mathematics	Archaeology	Engineering
Mathematics	Neuroscience	Computing	Agriculture	**Science**	Law
Computing	Computing	Statistics	Business	Law	Psychiatry
Agriculture	Astronomy	Psychiatry	Psychiatry	History	Mathematics
Statistics	Mathematics	Astronomy	Architecture	Business	Archaeology
Archaeology	Art	Economics	Criminology	Mathematics	Agriculture
Architecture	Music	Business	Computing	Neuroscience	Geography
Geography	Statistics	Criminology	Economics	Engineering	Criminology
Anthropology	Business	***Psychology***	Statistics	***Psychology***	Linguistics
Criminology	Law	Archaeology	History	Computing	Economics
Economics	Criminology	Linguistics	Music	Criminology	Business
Sociology	Economics	Philosophy	Geography	Psychiatry	***Psychology***
Linguistics	Psychiatry	Agriculture	Sociology	*Physics*	**Science**
Business	History	Geography	Linguistics	Statistics	History
Law	Anthropology	History	Humanities	Sociology	Anthropology
Humanities	***Psychology***	Music	Art	Anthropology	Music
Philosophy	Linguistics	Anthropology	Astronomy	Economics	Sociology
Theology	Sociology	Humanities	Archaeology	Linguistics	Theology
History	Humanities	Art	Anthropology	Philosophy	Humanities
Music	Theology	Theology	Philosophy	Humanities	Philosophy
Art	Philosophy	Sociology	Theology	Theology	Art

Note: The dotted line throughout the table indicates the median.

Discussion

The goal of this thesis was to examine whether a dual-processing account of cognition could explain the perception of psychology as unscientific. To achieve this goal, the present study replicated and extended upon Morgan (2015). A discrete free association paradigm (Nelson et al., 2004) was used to examine the semantic association between popular academic disciplines. Participants were shown 30 academic disciplines and asked to give the first word that came to mind that was meaningfully related to the cue. They were then asked to rate the same disciplines on six different dimensions: specificity, concreteness, difficulty, imageability, importance, and the extent to which the discipline is thought to be scientific. In order to examine different semantic networks between groups based on current level of education in psychology and scientific expertise, participants were asked to list their program and year of study, and they completed a scientific literacy questionnaire. Finally, participants' responses to the question "Is psychology a science?" were used as an explicit measure of participants' judgements about psychology as a science.

I argued that people might implicitly perceive psychology as different from other scientific fields of study (e.g., biology, chemistry, and physics) even though they know that it is a science. More specifically, I speculated that this difference could be due to the schemata that they hold for the sciences, which may be constructed by their topics and objects of study rather than their methodology. In an attempt to determine if a dual-processing account of cognition can explain the perception of psychology as unscientific, four hypotheses were formulated. Overall, this study has provided evidence to support them. Each hypothesis will be discussed next. Then, limitations will be acknowledged and suggestions will be made for future directions of research following this line of inquiry. Finally, suggestions to improve the perception of psychology as a science will be presented and will be based on a combination of the reviewed literature and the results of this present study.

The Implicit Perception of Psychology as a Science

It was hypothesized that psychology's perception as unscientific is rooted in individuals' implicit perception of the discipline. This hypothesis has been supported. The semantic strength linking science to the natural sciences (with the exception of biology) was stronger than that between science and psychology. Furthermore, the semantic strength between the natural sciences was stronger than that between psychology and the natural sciences. In other words, the associates elicited by the natural science cues and the cue science were similar to each other and different from those elicited by the term *psychology*. Likewise, even though the term *psychology* elicited *science* as a response associate, not one person responded with psychology when they were shown science. Meanwhile, the term *science* elicited all other cues of interest (i.e., *chemistry*, *physics*, *biology*, and *neuroscience*) as response associates. The most common associate between psychology and science was *brain*. This suggests that the study of neuroscience might be strengthening the association between psychology and science. More evidence of this comes from participants' explanations of why psychology is a science, as some argued that it is because psychology studies the brain. Other common associates that were generated for psychology and science (i.e., *experiment*, *research*, *theory*, and *study*) exemplify terms used to describe methodological terms common to other scientific disciplines. Yet, they were not sufficient to elicit the concept of science in relation to psychology. Perhaps this is because psychology shares few features with science, while also sharing features with non-scientific disciplines (e.g., philosophy and psychiatry) (See also Hernandez, 2015). From these findings, it might be fair to speculate that there is a misconceived notion of science: people might define science by the topics and objects that are studied rather that the methods used to study them. Krull and Silvera (2013) have also provided evidence to support this claim, as their participants rated equipment from the natural sciences (e.g., microscopes) to be more scientific than equipment from the behavioral sciences (e.g., questionnaires).

Science Schema

Next, it was hypothesized that science would be associated with its topics and objects of study rather than the methods used to study them. Three results were predicted. First, it was expected that the cue *science* would elicit topics and objects of study rather than methodological terms. Second, it was expected that the methodological terms generated for psychology and science would be similar. Third, it was expected that the topics and objects of study generated for science would be similar to the natural sciences including neuroscience, but different from psychology. The results supported these three hypotheses. So, if science is conceived of as the topics and objects of study, then they might evoke imagery that is either congruent or not with the schemata people have for the concept of science. In fact, the cues that had the strongest association to science (i.e., *chemistry*, *physics*, and *neurosciences*) were disciplines that may all be represented by topics and objects such as anatomy, atom, lab, and chemical. Perhaps, these topics and objects are more congruent with a science schema than the object *textbook*, which was the only object term that was elicited by the cue *psychology*. Therefore, one key feature in implicitly associating any discipline with science might be the likelihood that its topics and objects of study are similar to other scientific disciplines and different from non-scientific disciplines. Nonetheless, the results suggest that this is not the only feature important in associating disciplines with the term *science*.

Key Features of Science

The literature tends to focus on importance as an integral aspect of what makes psychology unscientific in the eyes of the public (e.g., Janda et al., 1998; Krull & Silvera 2013; Zimbardo, 2004). This present study found that participants were willing to rate psychology as both scientific and important. Furthermore, importance ratings were found to be highly correlated to scientific ratings. Still, the term *important* was not generated as an associate for any of the scientific disciplines, including psychology. Moreover, ratings of importance did not predict ratings of how scientific a discipline was once difficulty and concreteness had been accounted for in the stepwise regression. Hence, it could be argued that people might use the importance of a discipline to classify it as scientific when they reason explicitly. However, the data do suggest that importance is not implicitly associated with scientific disciplines.

Difficulty and Concreteness. When investigating the perception of psychology as scientific, researchers should focus on difficult and cue concreteness rather than focusing solely on importance. The natural sciences and neuroscience were rated as difficult and concrete, whereas psychology was rated low on both of these dimensions. The notion of perceived discipline difficulty was also found to be of interest within the semantic associative networks. For example, all cues of interest elicited the associate *difficult*, excluding psychology. This suggests that one major difference between psychology and the natural sciences is the perceived level of difficulty. Thus, people might be using it as a heuristic to perceive academic disciplines as scientific. As long as a discipline is scientific, cue concreteness might assist in strengthening the association between that discipline and science, as the features of the discipline are perceived as more tangible and thus more chronically accessible (Bargh, 1984). This line of argumentation might assist in explaining Weisberg et al.'s (2008) seductive allure of neuroscience findings, where participants were more likely to rate bad explanations of psychological findings as good if they included irrelevant neuroscience information. Perhaps, the features of neuroscience (e.g., the brain and fMRI scans) are more tangible, thus making the discipline more concrete and therefore more scientific. Ikeda et al.'s (2013) study also provides evidence to support this line of argumentation. Their participants were more likely to report a higher understanding of psychological phenomena when they included images of the brain. Therefore, if being able to visualize features of a scientific discipline can assist in strengthening the association between that discipline and science, it makes sense that neuroscience and the natural sciences would be more likely to be implicitly perceived of as scientific when compared to psychology. Perhaps, the more concrete a scientific discipline is, the more likely it is to evoke mental models congruent with science.

Knowledge and Fact Versus Common Sense. The results suggest that another distinction between psychology and science may be the use of the terms *knowledge* and *fact*. For some participants, the first word that came to mind when they saw the word *science* was either fact or knowledge. In fact, knowledge was more strongly associated to science than the term *physics*. Unfortunately, not one participant said fact or knowledge when they saw the word *psychology*. It is important to note that the natural sciences terms did not generate these terms either. Still, when asked why psychology is not a science, some participants reasoned that there are no scientific facts in psychology. Instead, psychological findings tend to be perceived as common sense (Stanovich, 2010). The results of this study provide evidence to support this position. Within the Attitude Toward Science portion of the Scientific Literacy questionnaire, a vast majority of participants agreed that “[t]heories founded in psychology can be attributed to common sense.” Stanovich argued that individuals often use folk wisdom (i.e., common sense) to make sense of behavior. However, most of these common sense proverbs (e.g., “out of sight, out of mind”) have directly opposing proverbs (e.g., “absence makes the heart grow fonder”). Therefore, individuals have the ability to select which common sense proverb they need to focus on depending on what is relevant to the situation. So, when they are presented with psychological research to suggest that one proverb is more likely than the other, the idea that the research findings are common sense is strengthened because they believe they already knew it. Thus, people tend to view psychology as merely common sense. One participant even reasoned that psychology is not a science because “[it] is just common sense”.

Public Representations: Einstein and Freud. The results of this study suggest that another feature that distinguishes psychology from science is the public figure representing the discipline. The results demonstrate that the most common public figure to represent science is Einstein. Unfortunately, Einstein’s semantic association to science was generally weaker than the association of Sigmund Freud to psychology. So, more people thought of Freud when they saw psychology than people who thought Einstein when they saw science. Furthermore, Freud was used by more than one participant to defend their reasoning that psychology is not a science. While Einstein is the prototype of a scientist, Freud represents non-scientific psychology. This may assist in explaining Morgan’s (2015) claim that psychology might be more readily thought of as a helping profession than a scientific one. More evidence of this is demonstrated by the strength of the semantic association between psychology and psychiatry that was much stronger compared to that of psychology and science.

Dualism: The Brain and the Mind. The results of this study have thus far provided evidence to suggest that psychology may be lacking key features that assist in associating disciplines with science. The perceived level of difficulty in psychology is low; the concreteness of the word psychology is low; psychology is perceived of as common sense rather than factual; and psychology lacks a credible scientific public figure to represent the discipline. However, while psychology might be lacking key features to assist making its perception scientific, one of its key features might assist in weakening its association to science: the mind. A large majority of people continue to believe in dualism, whereby a clear distinction is drawn between the mind and the rest of the body, including the brain regardless of the evidence that has been presented in opposition to this theory (Ventriglio & Bhugra, 2015). The results of this present study suggest that this mind-body distinction might contribute to the perception of psychology as unscientific. For instance, as opposed to psychology, the cue *neuroscience* was shown to have a strong semantic association to science and all of the natural sciences. Moreover, neuroscience was perceived as both difficult and concrete. Interestingly, while psychology and neuroscience share the strongest semantic association compared to any other pairing of disciplines, this association was not enough to strengthen the association between psychology and science. One plausible explanation is that the associate that strengthens the tie between neuroscience and science is the term *brain*. It is true that some participants elicited the response associate *brain* when they were shown psychology as well. However, more of them generated the term *mind* than they did *brain*. In addition, when shown the cue *science*, *brain* was elicited as a response associate, whereas *mind* was not. Thus, it appears as though the term *mind* might be detrimental to the concept of psychology as a science. Perhaps, it is the association psychology has with the mind that keeps people from implicitly associating psychology with science.

Psychology-Specific Education and Scientific Literacy

So far, the results discussed have provided evidence to support the notion that the perception of psychology as unscientific might be rooted in individuals' implicit perception of the discipline. However, it was hypothesized that a dual-processing account of cognition could be used to explain the perception of psychology as unscientific. Hence, it was expected that, while psychology-specific education and scientific literacy would impact participants' explicit perception (i.e., their willingness to categorize psychology as a science), it would not affect their implicit perception (i.e., the semantic relatedness between psychology, science, and the natural sciences). This hypothesis was partially supported by the results of this present study. For instance, psychology students were more likely to answer "yes" when asked whether or not psychology was a science. This result is in-line with the hypothesis. However, participants' scientific literacy scores did not affect their willingness to answer "yes" when asked whether or not psychology was a science. Thus, while psychology-specific education might affect individuals' explicit perception of psychology as a science, their scientific literacy did not.

Scientific Literacy

The results suggested that scientific literacy did not modify the implicit association between psychology and science. Interestingly, however, for those who performed well on the Scientific Literacy Questionnaire, the strength between biology and science increased as did the strength between biology and psychology. This might suggest that those with a more preliminary understanding of science might associate science with psychology through biology. One participant even reasoned that psychology is not a science because it uses other scientific disciplines, such as biology, to study human behavior. Still, these stronger associations were not enough to strengthen the semantic association between psychology and science. Those who scored below the median on the Scientific Literacy Questionnaire were less likely to generate methodological associates for science than those who scored above the median. This might suggest that having a deeper understanding of science prompts a more methodological perception of science. This provides evidence to support Weisberg et al.'s (2008) findings: the seductive allure of neuroscience might be stronger for those with a limited understanding of science. Overall, a greater understanding of science did not mediate the implicit or explicit perception of psychology as unscientific.

Psychology-Specific Education

It was also expected that psychology-specific education would not affect participants' implicit perception of psychology as scientific. Psychology-specific expertise did not seem to impact the participants' implicit perception of psychology as unscientific, as no clear differences between the groups' semantic associative networks were found. Therefore, psychology-specific education did not influence the association between psychology and science. Still, not one participant from the upper year psychology group thought of Freud when psychology was presented. This might suggest that individuals would be less likely to use Sigmund Freud as a representation of psychology if they had more psychology-specific education. Nevertheless, psychology-specific education did not influence the participants' implicit perception of psychology as a science overall. However, even though participants' program of study did not influence their implicit perception of psychology, their year of study might have. Generally, compared to first year students, the upper year students showed an increase in the association between psychology and science. Thus, more education, irrespective of program, might improve the perception of psychology as scientific, at least implicitly.

Dual-Processing Accounts of Cognition

To provide further evidence that the perception of psychology as unscientific can be explained by a dual-processing account of cognition, other measures of explicit and implicit perception were examined. Participants' scientific ratings of psychology were used as a measure of explicit perception. Meanwhile their ratings of psychology on any other dimension that might predict the scientific ratings were used as a measure of implicit perception. Thus, it was expected that the ratings of psychology as scientific should be relatively high. However, its ratings on any other dimension that might predict the scientific ratings were expected to be low compared to the other cues of interest. The results of this present study were in line with this hypothesis. Participants rated psychology relatively high on importance and how scientific they thought the discipline was. It was also found that participants' ratings of difficulty and concreteness predicted the scientific ratings. Moreover, participants rated psychology lower than at least half of the 30 academic disciplines for both these dimensions. Together, these results suggest that individuals have an explicit understanding that psychology is both important and scientific. Still, their implicit perception of psychology is that it is not scientific.

Limitations and Future Directions

Less than one-tenth of our sample claimed that psychology is not a science when asked explicitly. Thus, it can be argued that the perception of psychology as scientific was not an issue in our sample. However, not one of the 93 percent, who agreed that psychology is a science, said "psychology" when they saw the cue *science*. Moreover, psychology had a weaker semantic association to science compared to many other disciplines (e.g., engineering, statistics, computing). Furthermore, while some psychology students did not classify their field as scientific, not one natural science student claimed that their field was unscientific. Thus, results do provide evidence to suggest that, while explicit reasoning may lead people to agree that psychology is a science, their implicit perception of psychology is that it is different from typical sciences.

The methodologies that were used to measure the implicit perception and the explicit perception of psychology relative to other scientific fields of study were different. The implicit measure was a discrete free association task (Nelson et al., 2004) and the explicit measure was involved asking the question "Is psychology a science". Because there are methodological differences between the measures, it is plausible to argue that other factors might have contributed to the differences between them that are unrelated to the nature of the mental representation (i.e., implicit or explicit). Thus, future research should test more directly the ability of the dual-process framework to explain people's perception of psychology. For instance, an Implicit Attitude Test (Greenwald, McGhee, & Schwartz, 1998) could be used to measure reaction times for the relations among psychology, the natural sciences, and the features of science. These could then be evaluated in relation to explicit measures of scientific knowledge and psychology. The dual-process framework would predict that the output of these two types of measurement would be independent to a large extent.

Still, the present study also used the dimensions ratings task to demonstrate a difference between implicit and explicit attitudes toward psychology. Participants rated psychology as scientific. However, they rated psychology low on concreteness and difficulty. These two attributes were found to predict participant ratings of how scientific they thought the discipline to be. Therefore, this thesis examined two different methods for comparing explicit and implicit perceptions of psychology as a science. Moreover, both yielded similar results: explicitly, individuals are willing to categorize psychology as scientific. Yet, their implicit attitudes toward psychology is that it is different from *typical* sciences.

One result that is difficult to interpret is the relatively low semantic strength biology has with science. The strength of association between biology and science was comparable to that of psychology and science. Still, unlike psychology, biology was one of the top associates for the cue science.

Notwithstanding these limitations, the present study provides empirical evidence to help improve the perception of psychology as scientific. Future research should focus on examining the implicit perception of psychology as a science in order to better understand the reason why the discipline struggles to be accepted as a legitimate science. Achieving this goal will allow the field to adjust the way in which it is taught, change the dissemination of its findings to the public, and thus assist in changing the perception of psychology to genuinely scientific.

Improving the Perception of Psychology as Scientific

The goal of the present thesis was to examine the cognitive mechanisms underlying the perception of psychology as unscientific with a higher-order aim of improving its perception. The results suggested that a dual-processing account of cognition might be a key contributor.

Although individuals might have an explicit understanding that psychology is a science, their implicit perception of psychology is that of a non-scientific discipline. The results of this present study have also provided evidence to suggest that this unscientific implicit perception of psychology might be, at least in part, due to the common schemata that are used to represent the sciences. It was found that the science schema might comprise scientific objects and topics of study rather than the methodologies by which science is studied. Therefore, typical sciences might have a stronger association to the concept of science due to the features that they share with them. Conversely, psychology lacks these key features because its topics and objects of study (e.g., mind, behavior, textbook) are less related to science and more similar to non-scientific disciplines. Some of these results may therefore be used to inform classroom practice and improve psychology's image as a science.

Perceived Level of Difficulty

The key features that assist in the perception of disciplines as scientific have been discussed. It was found that perceived level of difficulty and discipline concreteness both assist in implicitly classifying a discipline as scientific. People appear to understand that psychology has made contributions to society, at least enough to merit the description of the discipline as important. However, people tend to view psychology as relatively easy compared to other disciplines. In fact, not only was psychology rated low on difficulty, some participants generated the term *easy* when shown the cue *psychology*. Altering the perception of psychology from an easy discipline to a difficult one might assist in its perception as a legitimate science. In fact, upper year students, whose implicit association between psychology and science was stronger, did not produce the term *easy* when prompted with *psychology*. Still, individuals' level of education made no impact on the likelihood of producing the term *difficult* for the cue *science*. Moreover, the cue *psychology* did not elicit the associate *difficult*. Students must be made aware that the discipline is, in fact, complex.

The Brain and the Mind Together

The results suggested that the association between psychology and the mind might be detrimental to its perception as science. Unlike the brain, the mind is not a concrete construct and therefore might be deemed unscientific. The fact that psychology was rated low on both concreteness and imageability can be used in support of this conjecture. Conversely, participants rated the natural sciences and neuroscience as highly concrete and imageable. The study of the brain is more concrete than the study of the mind because it can be more easily visualized. Moreover, the results of the free association task suggest that people might believe that neuroscience is the study of the brain and that psychology is the study of the mind. Researchers and teachers of psychology must find a way to end this dissociation between the mind and the brain. It needs to be made clear to psychology students that psychology and neuropsychology both aim to build cognitive theories based on empirical measurements. While psychology uses behavioral data to achieve this goal, neuropsychology uses behavioral and brain measurements. Thus, students must be taught that psychology's methods of theorizing about cognitive states are not any less scientific than neuropsychology's methods of theorizing about brain states. In other words, students must understand that psychology and physiology must be studied and understood concurrently. Furthermore, psychology is not merely the study of the mind. Psychology is the study of the interaction between mind and behavior. In this study, the results demonstrated that the associate *behavior* was common to the cue *psychology*. Still, behavior was not as common as the associate *mind*. Perhaps researchers and teachers of psychology should focus more on behavior. Unfortunately, the term behavior would not assist in increasing the discipline's concreteness. Unlike the tangible brain, chemicals, and human anatomy, behavior is not something that conjures up a specific image in one's mind.

The Freud Problem

For psychology to be taken seriously as a scientific discipline, another key feature is the public figure by which the discipline is represented. Psychology and science both elicited popular representatives as associates (i.e., Freud and Einstein). Still, even though biology and chemistry have famous scientists associated with the disciplines (e.g., Crick & Watson, Curie, and Darwin), these representatives were not generated by one participant. Students must understand that Sigmund Freud and psychoanalysis may have been important in the history of psychology, but that they are no longer relevant to experimental psychology. Contemporary psychologists strive to understand behavior using methods common to science. Freud's methods do not represent the way in which modern psychologists conduct their research. Rather than controlled experimentation, Freud used case studies and introspection to generalize his theories. Moreover, the psychoanalytic framework has been falsified (Stanovich, 2013).

Scientist-Practitioner Model

The scientist-practitioner model was introduced to the teaching of clinical psychology after the Boulder conference in 1949. The training model was designed for graduate programs to give students a foundation in the science underlying the practice of applied psychology. Since then, programs have begun to either emphasize the science of psychology or the practice (Fagan & Wise, 2000). In order for psychology to be taken seriously as a legitimate science, the discipline must focus on the science that underlies its professional practice. The results of this present study demonstrate that it is not common for natural science disciplines to evoke methodological terms. However, the associates that are common between psychology and science are terms that exemplify methodologies common to other scientific disciplines. Perhaps science is misunderstood as the topics and objects of study. Another possibility is there is a misunderstanding that the practice of typical sciences lead to facts and psychology does not. If this is true, students must be taught that the monolithic scientific method does not exist (Popper, 1983). Even within the natural sciences, disciplines' methodologies are not confined to some hypothetical-deductive recipe. Lilienfeld et al. (2015) argue that science should not be conceived of as a method but rather an approach to knowledge that is built on research methods used to minimize mistakes. The specific research methods used by psychologists, chemists, biologists, and physicists all share an epistemological disposition to understand the world. By helping students understand this, it will help them become aware that facts are no more common in the natural sciences than the study of psychology.

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Appendix A: Scientific Literacy Questionnaire

Scientific Literacy Questionnaire

The next part of this experiment will ask you questions about your knowledge and opinions concerning scientific topics and methodologies. It will be divided into three sections. First, you will be shown a series of scientific statements and you will have to say whether they are true, probably true, probably false, or false. Then, you will be given short scientific scenarios and you will be asked to identify the conclusion that follows from a selection of possible answers. Finally, you will be asked to give your opinion about scientific topics using a Likert scale.

Please think about your answers carefully, as you will not be given the change to go back to change your answers. However, please answer these questions to the best of your ability and do not look up the answers elsewhere. We are interested in what you know. If you cheat, it will diminish our ability to answer our research questions. Thank you for your continued participation!

Knowledge of Topics

The following is a series of scientific statements. Please indicate whether each statement is true or false using the following four indicators: (1) "I think that it's true", (2) "I think that it's true, but I'm not sure", (3) "I think that it's false, but I'm not sure.", or (4) "I think that it's false". In order to do this, you must place your cursor over the appropriate bubble and click on it.

Once you have finished all statements, please check your responses and click next. Remember you will not have a chance to come back to change your answers.

Thank you. Your continued participation is greatly appreciated!

The following is a series of scientific statements. Please indicate whether each statement is true or false using the following four indicators: (1) "I think that it's true", (2) "I think that it's true, but I'm not sure", (3) "I think that it's false, but I'm not sure.", or (4) "I think that it's false". In order to do this, you must place your cursor over the appropriate bubble and click on it.

Once you have finished all statements, please check your responses and click next. Remember you will not have a chance to come back to change your answers.

Thank you. Your continued participation is greatly appreciated!

	Statement	Answer
1	The oxygen that we breathe comes from plants.	TRUE
2	Lasers work by focusing sound waves.	FLASE
3	Electrons are smaller than atoms.	TRUE
4	The universe began with a huge explosion.	TRUE
5	The continents on which we live have been moving apart for millions of years, and will continue to move in the future.	TRUE
6	The earliest humans lived at the same time as the dinosaurs.	FALSE
7	Light travels faster than sound.	TRUE
8	On average, it takes 28 days for the earth to make a full orbit around the sun.	FALSE
9	Radioactive milk can be made sage by boiling it.	FALSE
10	Sunlight can cause skin cancer.	TRUE
11	Hot air rises.	TRUE
12	The liver makes urine.	FALSE
13	Antibiotics kill viruses as well as bacteria.	FALSE
14	Most people use only 10% of their brain's processing capacity.	FALSE
15	Opposites attract: people are typically attracted to partners who differ from them.	FALSE
16	Human memory works like a video or tape recorder.	FALSE
17	The psychiatric disorder known as autism is caused by prior exposure to mercury-based vaccines.	FALSE

Knowledge of Methodology

Next, you will be shown 11 short scientific scenarios one at a time. Please identify the conclusion that follows from the selection of possible answers. In order to do this, you must place your cursor over the appropriate bubble and click on it. Only one answer per question will be permitted.

Please remember you will not have a chance to come back to change your answers once you have clicked the next button.

Thank you. Your continued participation is greatly appreciated!

1	Scientists tend to weigh evidence in support of a theory more strongly than evidence produced against it.		
	a	I think that it's true.	INCORRECT
	b	I think that it's true, but I'm not sure.	INCORRECT
	c	I think that it's false but I'm not sure.	CORRECT
	d	I think that it's false.	CORRECT
2	Susan has noticed that none of the people in her life who smoke have suffered cancer. Instead, she notes that everyone she knows who has suffered the disease, was a non-smoker. Susan is right to conclude that smoking does not cause cancer, regardless of contradictory scientific findings.		
	a	I think that it's true.	INCORRECT
	b	I think that it's true, but I'm not sure.	INCORRECT
	c	I think that it's false but I'm not sure.	CORRECT
	d	I think that it's false.	CORRECT
3	Mary conducts analyses using a statistical software program and finds that the rising incidence of divorce has a strong relationship with the rising gas prices. Mary can now conclude that divorce is caused by an increase in gas prices.		
	a	I think that it's true.	INCORRECT
	b	I think that it's true, but I'm not sure.	INCORRECT
	c	I think that it's false but I'm not sure.	CORRECT
	d	I think that it's false.	CORRECT
4	Dr. Albert has recruited participants for his study on the effects of having a pet on Post Traumatic Stress Disorder (PTSD). Eleven people took part in the experiment, three of which suffered from PTSD. One of the participants with PTSD already had a dog and one had a pet fish. Dr. Albert found that the participants with pets were less likely to experience a high physiological stress response to trauma-related cues. Dr. Albert is right in concluding that having a pet has positive therapeutic effects on PTSD.		
	a	I think that it's true.	INCORRECT
	b	I think that it's true, but I'm not sure.	INCORRECT
	c	I think that it's false but I'm not sure.	CORRECT
	d	I think that it's false.	CORRECT

5	Your favorite hockey player has not scored a goal over the last nine games. If it is assumed that he has a 50:50 chance of either scoring a goal or not in each game, it can be concluded that there is an increased likelihood that he will score a goal in the next game.		
	a	I think that it's true.	INCORRECT
	b	I think that it's true, but I'm not sure.	INCORRECT
	c	I think that it's false but I'm not sure.	CORRECT
	d	I think that it's false.	CORRECT
6	A company has developed a diet pill that helps people feel less hungry. To support the statement that this pill leads people to lose weight, one hundred people are asked to take it daily and to follow a diet that reduces calorie intake by 20%. At the end of one month, 88 people in the sample out of 100 lost 5 or more pounds. Hence, the company claimed that the pill had worked as intended. Would scientists believe that this experience had produced strong support for efficacy of this weight loss pill?		
	a	Yes	INCORRECT
	b	No	CORRECT
7	Suppose a drug used to treat high blood pressure is suspected of not working well. The following is a list of three different ways scientists might use to investigate the problem. Which one do you think scientists would be most likely to use?		
	a	Talk to patients to get their opinions	INCORRECT
	b	Use their knowledge of medicine to decide how good the drug is	INCORRECT
	c	Give the drug to some patients by not to others. Then compare what happens to each group.	CORRECT
8	When scientists talk about Einstein’s theory of relativity, scientists are talking about		
	a	A hunch or idea	INCORRECT
	b	A well established explanation	CORRECT
	c	A proven fact	INCORRECT

9	A doctor tells a couple that they have a one in four chance of having a child with an illness. Does this mean that,		
	a	If they have only three children, none will have the illness?	INCORRECT
	b	If their first child has the illness, the next three will not?	INCORRECT
	c	Each of the couple's children will have the same risk of suffering the illness?	CORRECT
	d	If the first three children are healthy, the fourth will have the illness?	INCORRECT
10	When scientists talk about Newton's First Law, scientists are talking about		
	a	A hunch or idea	INCORRECT
	b	A well established explanation	INCORRECT
	c	A proven fact	CORRECT
11	When scientists discuss hypotheses, scientists are talking about		
	a	A hunch or idea	CORRECT
	b	A well established explanation	INCORRECT
	c	A proven fact	INCORRECT

Attitude Toward Science

The following is a series of statements about science. Please tell us how strongly you agree or disagree with these statements. In order to do this, you must place your cursor over the appropriate bubble and click on it. Only one answer per question will be permitted.

There are no right or wrong answers here, as we are simply interested in your opinion. So please be honest in your responses. Also, please remember you will not have a chance to come back to change your answers once you have clicked the next button.

Thank you. Your continued participation is greatly appreciated!

	Statement
1	All of today's scientific theories will still be accepted in a hundred years' time.
2	Natural vitamins are better for you than laboratory-made ones.
3	There are phenomena that physical science and the laws of nature cannot explain.
4	The positions of the planets have an influence on the events of everyday life.
5	UFOs are real and should be investigated.
6	Some people possess psychic powers.
7	Nuclear power is an important energy source and its use should be expanded.
8	Some ancient civilizations were visited by extraterrestrials..
9	Computers will eventually be intelligent enough to think like humans.
10	Scientists should take responsibility to the bad effects of their theories and inventions.
11	The government should strongly support the manned space program.
12	Genetic engineering is a good idea.
13	We should devote more of our money and scientific resources to repair damage done to the environment.
14	Pure science should be funded regardless of its lack of immediate benefit to society.
15	Science will come up with a way to dispose of toxic waste.
16	Faith healing is a valid alternative to conventional medicine.
17	We should make a concerted effort to search for life on other planets.
18	Scientists should be allowed to do research that causes pain to animals, if it helps solve human health problems.
19	Some numbers are especially lucky for some people.
20	Theories founded in psychology can be attributed to common sense.

Appendix B: Associate Strengths

CUE	Associates	#P	#G	FSG	N	BSG
ART	Abstract	4	489	.0082	N	.0000
ART	Artist	4	489	.0082	N	.0000
ART	Beauty	29	489	.0593	N	.0000
ART	Boring	3	489	.0061	N	.0000
ART	Class	2	489	.0041	N	.0000
ART	Colour	18	489	.0368	N	.0000
ART	Create	2	489	.0041	N	.0000
ART	Creative	26	489	.0532	N	.0000
ART	Creativity	26	489	.0532	N	.0000
ART	Dance	6	489	.0123	N	.0000
ART	Design	2	489	.0041	N	.0000
ART	Draw	2	489	.0041	N	.0000
ART	Drawing	26	489	.0532	N	.0000
ART	Emotion	5	489	.0102	N	.0000
ART	Express	35	489	.0716	N	.0000
ART	Free	2	489	.0041	N	.0000
ART	Freedom	4	489	.0082	N	.0000
ART	Gallery	2	489	.0041	N	.0000
ART	Happy	5	489	.0102	N	.0000
ART	History	4	489	.0082	Y	.0000
ART	Imagination	2	489	.0041	N	.0000
ART	Love	4	489	.0082	N	.0000
ART	Mona Lisa	3	489	.0061	N	.0000
ART	Museum	7	489	.0143	N	.0000
ART	Music	17	489	.0348	Y	.0947
ART	Paint	34	489	.0695	N	.0000
ART	Paintbrush	4	489	.0082	N	.0000
ART	Painting	101	489	.2065	N	.0000
ART	Passion	3	489	.0061	N	.0000
ART	Peace	2	489	.0041	N	.0000
ART	Picasso	12	489	.0245	N	.0000
ART	Picture	13	489	.0266	N	.0000
ART	Renaissance	2	489	.0041	N	.0000
ART	Van Gogh	3	489	.0061	N	.0000
ART	Visual	4	489	.0082	N	.0000

SCIENCE	Academic	3	492	.0061	N	.0000
SCIENCE	Animal	2	492	.0041	N	.0000
SCIENCE	Atom	2	492	.0041	N	.0000
SCIENCE	Beaker	5	492	.0102	N	.0000
SCIENCE	Bill Nye	3	492	.0061	N	.0000
SCIENCE	Biology	53	492	.1077	Y	.0348
SCIENCE	Body	2	492	.0041	N	.0000
SCIENCE	Boring	3	492	.0061	N	.0000
SCIENCE	Brain	6	492	.0122	N	.0000
SCIENCE	Chemical	18	492	.0366	N	.0000
SCIENCE	Chemistry	42	492	.0854	Y	.0573
SCIENCE	Complex	3	492	.0061	N	.0000
SCIENCE	Computer	4	492	.0081	N	.0000
SCIENCE	Difficult	19	492	.0386	N	.0000
SCIENCE	Discipline	2	492	.0041	N	.0000
SCIENCE	Discovery	7	492	.0142	N	.0000
SCIENCE	Doctor	2	492	.0041	N	.0000
SCIENCE	Earth	6	492	.0122	N	.0000
SCIENCE	Einstein	5	492	.0102	N	.0000
SCIENCE	Engineering	2	492	.0041	Y	.0168
SCIENCE	Experiment	17	492	.0346	N	.0000
SCIENCE	Explore	2	492	.0041	N	.0000
SCIENCE	Fact	8	492	.0163	N	.0000
SCIENCE	Fascinating	2	492	.0041	N	.0000
SCIENCE	Fiction	3	492	.0061	N	.0000
SCIENCE	Future	4	492	.0081	N	.0000
SCIENCE	Intelligent	34	492	.0691	N	.0000
SCIENCE	Interesting	7	492	.0142	N	.0000
SCIENCE	Knowledge	10	492	.0203	N	.0000
SCIENCE	Lab	34	492	.0691	N	.0000
SCIENCE	Learn	2	492	.0041	N	.0000
SCIENCE	Life	3	492	.0061	N	.0000
SCIENCE	Logic	4	492	.0081	N	.0000
SCIENCE	Major	3	492	.0061	N	.0000
SCIENCE	Mathematics	14	492	.0285	Y	.0042
SCIENCE	Medicine	6	492	.0122	Y	.0000
SCIENCE	Microscope	2	492	.0041	N	.0000
SCIENCE	Molecule	2	492	.0041	N	.0000

SCIENCE	Nature	4	492	.0081	N	.0000
SCIENCE	Nerd	4	492	.0081	N	.0000
SCIENCE	Neuron	2	492	.0041	N	.0000
SCIENCE	Neuroscience	3	492	.0061	Y	.0000
SCIENCE	Physics	9	492	.0183	Y	.0690
SCIENCE	Planet	2	492	.0041	N	.0000
SCIENCE	Progress	3	492	.0061	N	.0000
SCIENCE	Project	2	492	.0041	N	.0000
SCIENCE	Research	10	492	.0203	N	.0000
SCIENCE	School	2	492	.0041	N	.0000
SCIENCE	Scientist	2	492	.0041	N	.0000
SCIENCE	Space	7	492	.0142	N	.0000
SCIENCE	Study	2	492	.0041	N	.0000
SCIENCE	Technology	12	492	.0244	N	.0000
SCIENCE	Test Tube	2	492	.0041	N	.0000
SCIENCE	Theory	4	492	.0081	N	.0000
SCIENCE	Think	3	492	.0061	N	.0000
SCIENCE	Truth	2	492	.0041	N	.0000
SCIENCE	Universe	3	492	.0061	N	.0000
BUSINESS	Accounting	6	492	.0122	N	.0000
BUSINESS	Administration	3	492	.0061	N	.0000
BUSINESS	Book	2	492	.0041	N	.0000
BUSINESS	Boring	7	492	.0142	N	.0000
BUSINESS	Breifcase	12	492	.0244	N	.0000
BUSINESS	Building	4	492	.0081	N	.0000
BUSINESS	Casual	3	492	.0061	N	.0000
BUSINESS	Ceo	2	492	.0041	N	.0000
BUSINESS	Commerce	4	492	.0081	N	.0000
BUSINESS	Company	5	492	.0102	N	.0000
BUSINESS	Compete	2	492	.0041	N	.0000
BUSINESS	Corporation	3	492	.0061	N	.0000
BUSINESS	Deal	2	492	.0041	N	.0000
BUSINESS	Degree	2	492	.0041	N	.0000
BUSINESS	Difficult	5	492	.0102	N	.0000
BUSINESS	Donald Trump	2	492	.0041	N	.0000
BUSINESS	Economics	6	492	.0122	Y	.0474
BUSINESS	Economy	6	492	.0122	N	.0000
BUSINESS	Entrepreneur	10	492	.0203	N	.0000

BUSINESS	Executive	2	492	.0041	N	.0000
BUSINESS	Finance	9	492	.0183	N	.0000
BUSINESS	Formal	3	492	.0061	N	.0000
BUSINESS	Intelligent	4	492	.0081	N	.0000
BUSINESS	Leadership	2	492	.0041	N	.0000
BUSINESS	Major	2	492	.0041	N	.0000
BUSINESS	Man	8	492	.0163	N	.0000
BUSINESS	Management	5	492	.0102	N	.0000
BUSINESS	Manager	2	492	.0041	N	.0000
BUSINESS	Marketing	11	492	.0224	N	.0000
BUSINESS	Mathematics	9	492	.0183	Y	.0000
BUSINESS	Meeting	3	492	.0061	N	.0000
BUSINESS	Money	165	492	.3354	N	.0000
BUSINESS	Number	7	492	.0142	N	.0000
BUSINESS	Office	2	492	.0041	N	.0000
BUSINESS	Paper	3	492	.0061	N	.0000
BUSINESS	Person	2	492	.0041	N	.0000
BUSINESS	Persuade	2	492	.0041	N	.0000
BUSINESS	Plan	2	492	.0041	N	.0000
BUSINESS	Power	2	492	.0041	N	.0000
BUSINESS	Professional	5	492	.0102	N	.0000
BUSINESS	Profit	3	492	.0061	N	.0000
BUSINESS	Rich	2	492	.0041	N	.0000
BUSINESS	Stock	3	492	.0061	N	.0000
BUSINESS	Store	2	492	.0041	N	.0000
BUSINESS	Suit	32	492	.0650	N	.0000
BUSINESS	Suitcase	2	492	.0041	N	.0000
BUSINESS	Tax	3	492	.0061	N	.0000
BUSINESS	Wealth	3	492	.0061	N	.0000
BUSINESS	Work	3	492	.0061	N	.0000
ARCHITECTURE	Art	11	494	.0223	Y	.0000
ARCHITECTURE	Beauty	8	494	.0162	N	.0000
ARCHITECTURE	Blueprint	5	494	.0101	N	.0000
ARCHITECTURE	Boring	2	494	.0040	N	.0000
ARCHITECTURE	Bridge	4	494	.0081	N	.0000
ARCHITECTURE	Build	4	494	.0081	N	.0000
ARCHITECTURE	Building	239	494	.4838	N	.0000
ARCHITECTURE	City	2	494	.0040	N	.0000

ARCHITECTURE	Cn Tower	2	494	.0040	N	.0000
ARCHITECTURE	Complex	2	494	.0040	N	.0000
ARCHITECTURE	Construction	2	494	.0040	N	.0000
ARCHITECTURE	Cool	2	494	.0040	N	.0000
ARCHITECTURE	Create	2	494	.0040	N	.0000
ARCHITECTURE	Creative	12	494	.0243	N	.0000
ARCHITECTURE	Design	51	494	.1032	N	.0000
ARCHITECTURE	Difficult	9	494	.0182	N	.0000
ARCHITECTURE	Draw	2	494	.0040	N	.0000
ARCHITECTURE	Drawing	11	494	.0223	N	.0000
ARCHITECTURE	Engineer	2	494	.0040	N	.0000
ARCHITECTURE	Engineering	2	494	.0040	Y	.0000
ARCHITECTURE	Fun	2	494	.0040	N	.0000
ARCHITECTURE	Home	2	494	.0040	N	.0000
ARCHITECTURE	House	11	494	.0223	N	.0000
ARCHITECTURE	Intelligent	2	494	.0040	N	.0000
ARCHITECTURE	Interesting	3	494	.0061	N	.0000
ARCHITECTURE	Line	2	494	.0040	N	.0000
ARCHITECTURE	Roman	2	494	.0040	N	.0000
ARCHITECTURE	Rome	4	494	.0081	N	.0000
ARCHITECTURE	Sculpture	2	494	.0040	N	.0000
ARCHITECTURE	Sketch	2	494	.0040	N	.0000
ARCHITECTURE	Skyscraper	4	494	.0081	N	.0000
ARCHITECTURE	Structure	15	494	.0304	N	.0000
ARCHITECTURE	Unsure	2	494	.0040	N	.0000
ARCHITECTURE	Wall	2	494	.0040	N	.0000
ARCHITECTURE	Work	2	494	.0040	N	.0000
PSYCHOLOGY	Answer	2	487	.0041	N	.0000
PSYCHOLOGY	Behaviour	17	487	.0349	N	.0000
PSYCHOLOGY	Boring	2	487	.0041	N	.0000
PSYCHOLOGY	Brain	116	487	.2382	N	.0000
PSYCHOLOGY	Class	5	487	.0103	N	.0000
PSYCHOLOGY	Cognition	4	487	.0082	N	.0000
PSYCHOLOGY	Complex	4	487	.0082	N	.0000
PSYCHOLOGY	Confusing	2	487	.0041	N	.0000
PSYCHOLOGY	Curiosity	2	487	.0041	N	.0000
PSYCHOLOGY	Doctor	4	487	.0082	N	.0000
PSYCHOLOGY	Easy	2	487	.0041	N	.0000

PSYCHOLOGY	Experiment	6	487	.0123	N	.0000
PSYCHOLOGY	Feeling	2	487	.0041	N	.0000
PSYCHOLOGY	Freud	8	487	.0164	N	.0000
PSYCHOLOGY	Human	2	487	.0041	N	.0000
PSYCHOLOGY	Intelligent	5	487	.0103	N	.0000
PSYCHOLOGY	Interesting	11	487	.0226	N	.0000
PSYCHOLOGY	Intuitive	2	487	.0041	N	.0000
PSYCHOLOGY	Learn	3	487	.0062	N	.0000
PSYCHOLOGY	Major	5	487	.0103	N	.0000
PSYCHOLOGY	Mental	5	487	.0103	N	.0000
PSYCHOLOGY	Mental Health	5	487	.0103	N	.0000
PSYCHOLOGY	Mental Illness	2	487	.0041	N	.0000
PSYCHOLOGY	Mind	132	487	.2710	N	.0000
PSYCHOLOGY	Mystery	2	487	.0041	N	.0000
PSYCHOLOGY	Necessary	2	487	.0041	N	.0000
PSYCHOLOGY	Neuroscience	2	487	.0041	Y	.0000
PSYCHOLOGY	Observant	2	487	.0041	N	.0000
PSYCHOLOGY	Online	2	487	.0041	N	.0000
PSYCHOLOGY	People	6	487	.0123	N	.0000
PSYCHOLOGY	Personality	3	487	.0062	N	.0000
PSYCHOLOGY	Psychologist	3	487	.0062	N	.0000
PSYCHOLOGY	Research	2	487	.0041	N	.0000
PSYCHOLOGY	School	4	487	.0082	N	.0000
PSYCHOLOGY	Science	7	487	.0144	Y	.0000
PSYCHOLOGY	Study	8	487	.0164	N	.0000
PSYCHOLOGY	Test	2	487	.0041	N	.0000
PSYCHOLOGY	Textbook	2	487	.0041	N	.0000
PSYCHOLOGY	Theory	3	487	.0062	N	.0000
PSYCHOLOGY	Therapist	3	487	.0062	N	.0000
PSYCHOLOGY	Therapy	2	487	.0041	N	.0000
PSYCHOLOGY	Think	8	487	.0164	N	.0000
PSYCHOLOGY	Thought	4	487	.0082	N	.0000
PSYCHOLOGY	Understanding	4	487	.0082	N	.0000
PHYSICS	Atom	7	493	.0142	N	.0000
PHYSICS	Awful	2	493	.0041	N	.0000
PHYSICS	Ball	2	493	.0041	N	.0000
PHYSICS	Big Bang	4	493	.0081	N	.0000
PHYSICS	Boring	4	493	.0081	N	.0000

PHYSICS	Calculation	6	493	.0122	N	.0000
PHYSICS	Car	2	493	.0041	N	.0000
PHYSICS	Class	2	493	.0041	N	.0000
PHYSICS	Complex	2	493	.0041	N	.0000
PHYSICS	Complicated	4	493	.0081	N	.0000
PHYSICS	Difficult	40	493	.0811	N	.0000
PHYSICS	E=Mc2	2	493	.0041	N	.0000
PHYSICS	Einstein	3	493	.0061	N	.0000
PHYSICS	Energy	4	493	.0081	N	.0000
PHYSICS	Equation	6	493	.0122	N	.0000
PHYSICS	Fail	2	493	.0041	N	.0000
PHYSICS	Force	15	493	.0304	N	.0000
PHYSICS	Formula	6	493	.0122	N	.0000
PHYSICS	Gravity	28	493	.0568	N	.0000
PHYSICS	Hate	3	493	.0061	N	.0000
PHYSICS	Inertia	2	493	.0041	N	.0000
PHYSICS	Intelligent	11	493	.0223	N	.0000
PHYSICS	Kinetics	4	493	.0081	N	.0000
PHYSICS	Lab	4	493	.0081	N	.0000
PHYSICS	Law	5	493	.0101	Y	.0000
PHYSICS	Light	5	493	.0101	N	.0000
PHYSICS	Logic	2	493	.0041	N	.0000
PHYSICS	Mathematics	80	493	.1623	Y	.0000
PHYSICS	Matter	3	493	.0061	N	.0000
PHYSICS	Measurements	2	493	.0041	N	.0000
PHYSICS	Mechanics	3	493	.0061	N	.0000
PHYSICS	Motion	12	493	.0243	N	.0000
PHYSICS	Movement	15	493	.0304	N	.0000
PHYSICS	Nature	5	493	.0101	N	.0000
PHYSICS	Newton	14	493	.0284	N	.0000
PHYSICS	Number	10	493	.0203	N	.0000
PHYSICS	Quantum	3	493	.0061	N	.0000
PHYSICS	Relativity	3	493	.0061	N	.0000
PHYSICS	Science	34	493	.0690	Y	.0000
PHYSICS	Space	12	493	.0243	N	.0000
PHYSICS	Speed	2	493	.0041	N	.0000
PHYSICS	Study	2	493	.0041	N	.0000
PHYSICS	Theory	2	493	.0041	N	.0000

PHYSICS	Understanding	2	493	.0041	N	.0000
PHYSICS	Universe	8	493	.0162	N	.0000
PHYSICS	Unknown	2	493	.0041	N	.0000
PHYSICS	Vector	4	493	.0081	N	.0000
PHYSICS	Velocity	4	493	.0081	N	.0000
PHYSICS	World	2	493	.0041	N	.0000
CHEMISTRY	Amazing	2	489	.0041	N	.0000
CHEMISTRY	Atom	20	489	.0409	N	.0000
CHEMISTRY	Balance	2	489	.0041	N	.0000
CHEMISTRY	Beaker	11	489	.0225	N	.0000
CHEMISTRY	Biology	4	489	.0082	Y	.0061
CHEMISTRY	Bond	7	489	.0143	N	.0000
CHEMISTRY	Breaking Bad	2	489	.0041	N	.0000
CHEMISTRY	Bubble	2	489	.0041	N	.0000
CHEMISTRY	Chemical	97	489	.1984	N	.0000
CHEMISTRY	Combination	2	489	.0041	N	.0000
CHEMISTRY	Compound	2	489	.0041	N	.0000
CHEMISTRY	Cool	3	489	.0061	N	.0000
CHEMISTRY	Difficult	18	489	.0368	N	.0000
CHEMISTRY	Drug	4	489	.0082	N	.0000
CHEMISTRY	Element	27	489	.0552	N	.0000
CHEMISTRY	Equation	4	489	.0082	N	.0000
CHEMISTRY	Experiment	14	489	.0286	N	.0000
CHEMISTRY	Explosion	7	489	.0143	N	.0000
CHEMISTRY	Formula	8	489	.0164	N	.0000
CHEMISTRY	Fun	3	489	.0061	N	.0000
CHEMISTRY	Intelligent	2	489	.0041	N	.0000
CHEMISTRY	Interesting	3	489	.0061	N	.0000
CHEMISTRY	Lab	25	489	.0511	N	.0000
CHEMISTRY	Liquid	3	489	.0061	N	.0000
CHEMISTRY	Love	5	489	.0102	N	.0000
CHEMISTRY	Mathematics	4	489	.0082	Y	.0000
CHEMISTRY	Matter	4	489	.0082	N	.0000
CHEMISTRY	Medicine	2	489	.0041	Y	.0041
CHEMISTRY	Mix	8	489	.0164	N	.0000
CHEMISTRY	Molecule	15	489	.0307	N	.0000
CHEMISTRY	Moles	2	489	.0041	N	.0000
CHEMISTRY	Particle	2	489	.0041	N	.0000

CHEMISTRY	Periodic	17	489	.0348	N	.0000
CHEMISTRY	Potion	9	489	.0184	N	.0000
CHEMISTRY	Proton	2	489	.0041	N	.0000
CHEMISTRY	Reaction	25	489	.0511	N	.0000
CHEMISTRY	Science	28	489	.0573	Y	.0000
CHEMISTRY	Scientist	3	489	.0061	N	.0000
CHEMISTRY	Set	2	489	.0041	N	.0000
CHEMISTRY	Solution	5	489	.0102	N	.0000
CHEMISTRY	Study	2	489	.0041	N	.0000
CHEMISTRY	Substance	5	489	.0102	N	.0000
CHEMISTRY	Test Tube	11	489	.0225	N	.0000
CHEMISTRY	Work	2	489	.0041	N	.0000
BIOLOGY	Anatomy	21	489	.0429	N	.0000
BIOLOGY	Animal	65	489	.1329	N	.0000
BIOLOGY	Blood	5	489	.0102	N	.0000
BIOLOGY	Body	57	489	.1166	N	.0000
BIOLOGY	Brain	6	489	.0123	N	.0000
BIOLOGY	Cell	28	489	.0573	N	.0000
BIOLOGY	Chemistry	3	489	.0061	Y	.0000
BIOLOGY	Difficult	3	489	.0061	N	.0000
BIOLOGY	Dissect	17	489	.0348	N	.0000
BIOLOGY	Dna	6	489	.0123	N	.0000
BIOLOGY	Doctor	4	489	.0082	N	.0000
BIOLOGY	Dog	2	489	.0041	N	.0000
BIOLOGY	Enviroment	7	489	.0143	N	.0000
BIOLOGY	Evolution	2	489	.0041	N	.0000
BIOLOGY	Experiment	2	489	.0041	N	.0000
BIOLOGY	Frog	13	489	.0266	N	.0000
BIOLOGY	Genes	3	489	.0061	N	.0000
BIOLOGY	Genetics	5	489	.0102	N	.0000
BIOLOGY	Hate	2	489	.0041	N	.0000
BIOLOGY	Health	3	489	.0061	N	.0000
BIOLOGY	Human	16	489	.0327	N	.0000
BIOLOGY	Interesting	5	489	.0102	N	.0000
BIOLOGY	Lab	3	489	.0061	N	.0000
BIOLOGY	Life	41	489	.0838	N	.0000
BIOLOGY	Medicine	2	489	.0041	Y	.0000
BIOLOGY	Memorize	6	489	.0123	N	.0000

BIOLOGY	Nature	20	489	.0409	N	.0000
BIOLOGY	Organ	4	489	.0082	N	.0000
BIOLOGY	Organism	19	489	.0389	N	.0000
BIOLOGY	Plant	33	489	.0675	N	.0000
BIOLOGY	Reproduction	2	489	.0041	N	.0000
BIOLOGY	Science	17	489	.0348	Y	.0000
BIOLOGY	Sex	2	489	.0041	N	.0000
BIOLOGY	Specimen	2	489	.0041	N	.0000
BIOLOGY	Student	2	489	.0041	N	.0000
BIOLOGY	System	2	489	.0041	N	.0000
ASTRONOMY	Astronaut	3	491	.0061	N	.0000
ASTRONOMY	Boring	2	491	.0041	N	.0000
ASTRONOMY	Constellation	2	491	.0041	N	.0000
ASTRONOMY	Earth	2	491	.0041	N	.0000
ASTRONOMY	Galaxy	5	491	.0102	N	.0000
ASTRONOMY	Galileo	3	491	.0061	N	.0000
ASTRONOMY	Interesting	3	491	.0061	N	.0000
ASTRONOMY	Milky Way	2	491	.0041	N	.0000
ASTRONOMY	Moon	4	491	.0081	N	.0000
ASTRONOMY	Planet	35	491	.0713	N	.0000
ASTRONOMY	Science	4	491	.0081	Y	.0000
ASTRONOMY	Sky	2	491	.0041	N	.0000
ASTRONOMY	Solar System	3	491	.0061	N	.0000
ASTRONOMY	Space	138	491	.2811	N	.0000
ASTRONOMY	Spacecraft	2	491	.0041	N	.0000
ASTRONOMY	Star	218	491	.4440	N	.0000
ASTRONOMY	Sun	2	491	.0041	N	.0000
ASTRONOMY	Telescope	3	491	.0061	N	.0000
ASTRONOMY	Universe	9	491	.0183	N	.0000
ASTRONOMY	Unsure	2	491	.0041	N	.0000
ASTRONOMY	Vast	2	491	.0041	N	.0000
ASTRONOMY	Wonder	2	491	.0041	N	.0000
MEDICINE	Advil	8	490	.0163	N	.0000
MEDICINE	Antibiotics	2	490	.0041	N	.0000
MEDICINE	Bad	2	490	.0041	N	.0000
MEDICINE	Blood	2	490	.0041	N	.0000
MEDICINE	Cancer	2	490	.0041	N	.0000
MEDICINE	Chemistry	2	490	.0041	Y	.0000

MEDICINE	Cure	17	490	.0347	N	.0000
MEDICINE	Difficult	2	490	.0041	N	.0000
MEDICINE	Disease	2	490	.0041	N	.0000
MEDICINE	Doctor	133	490	.2714	N	.0000
MEDICINE	Drug	23	490	.0469	N	.0000
MEDICINE	Greys Anatomy	2	490	.0041	N	.0000
MEDICINE	Heal	22	490	.0449	N	.0000
MEDICINE	Health	45	490	.0918	N	.0000
MEDICINE	Healthcare	3	490	.0061	N	.0000
MEDICINE	Help	20	490	.0408	N	.0000
MEDICINE	Hospital	12	490	.0245	N	.0000
MEDICINE	Illness	3	490	.0061	N	.0000
MEDICINE	Important	6	490	.0122	N	.0000
MEDICINE	Intelligent	3	490	.0061	N	.0000
MEDICINE	Lab Coat	2	490	.0041	N	.0000
MEDICINE	Life	3	490	.0061	N	.0000
MEDICINE	Medication	3	490	.0061	N	.0000
MEDICINE	Money	2	490	.0041	N	.0000
MEDICINE	Necessary	2	490	.0041	N	.0000
MEDICINE	Needle	8	490	.0163	N	.0000
MEDICINE	Nurse	3	490	.0061	N	.0000
MEDICINE	Patient	2	490	.0041	N	.0000
MEDICINE	Penicillin	2	490	.0041	N	.0000
MEDICINE	People	2	490	.0041	N	.0000
MEDICINE	Pharmaceutical	4	490	.0082	N	.0000
MEDICINE	Pharmacist	4	490	.0082	N	.0000
MEDICINE	Pharmacy	9	490	.0184	N	.0000
MEDICINE	Pill	31	490	.0633	N	.0000
MEDICINE	Poison	2	490	.0041	N	.0000
MEDICINE	Prescription	3	490	.0061	N	.0000
MEDICINE	Save	5	490	.0102	N	.0000
MEDICINE	Sick	21	490	.0429	N	.0000
MEDICINE	Stethoscope	2	490	.0041	N	.0000
MEDICINE	Treatment	5	490	.0102	N	.0000
MEDICINE	Tylenol	3	490	.0061	N	.0000
MEDICINE	Vaccine	5	490	.0102	N	.0000
MEDICINE	Weed	2	490	.0041	N	.0000
ENGINEERING	Aerospace	2	476	.0042	N	.0000

ENGINEERING	Blueprint	2	476	.0042	N	.0000
ENGINEERING	Bridge	11	476	.0231	N	.0000
ENGINEERING	Build	9	476	.0189	N	.0000
ENGINEERING	Building	39	476	.0819	N	.0000
ENGINEERING	Calcuation	3	476	.0063	N	.0000
ENGINEERING	Car	21	476	.0441	N	.0000
ENGINEERING	Civil	5	476	.0105	N	.0000
ENGINEERING	Complicated	2	476	.0042	N	.0000
ENGINEERING	Computer	4	476	.0084	N	.0000
ENGINEERING	Construct	9	476	.0189	N	.0000
ENGINEERING	Create	11	476	.0231	N	.0000
ENGINEERING	Design	17	476	.0357	N	.0000
ENGINEERING	Difficult	36	476	.0756	N	.0000
ENGINEERING	Douche	3	476	.0063	N	.0000
ENGINEERING	Electrical	4	476	.0084	N	.0000
ENGINEERING	Engine	4	476	.0084	N	.0000
ENGINEERING	Fix	3	476	.0063	N	.0000
ENGINEERING	Future	3	476	.0063	N	.0000
ENGINEERING	Gear	4	476	.0084	N	.0000
ENGINEERING	Good Job	2	476	.0042	N	.0000
ENGINEERING	House	2	476	.0042	N	.0000
ENGINEERING	Improvement	2	476	.0042	N	.0000
ENGINEERING	Innovation	12	476	.0252	N	.0000
ENGINEERING	Intelligent	22	476	.0462	N	.0000
ENGINEERING	Invent	3	476	.0063	N	.0000
ENGINEERING	Law	2	476	.0042	Y	.0000
ENGINEERING	Machine	17	476	.0357	N	.0000
ENGINEERING	Mathematics	46	476	.0966	Y	.0000
ENGINEERING	Mechanical	12	476	.0252	N	.0000
ENGINEERING	Mechanics	11	476	.0231	N	.0000
ENGINEERING	Money	6	476	.0126	N	.0000
ENGINEERING	Nerd	4	476	.0084	N	.0000
ENGINEERING	Overrated	2	476	.0042	N	.0000
ENGINEERING	Physics	7	476	.0147	Y	.0000
ENGINEERING	Purple	2	476	.0042	N	.0000
ENGINEERING	Ring	5	476	.0105	N	.0000
ENGINEERING	Road	2	476	.0042	N	.0000
ENGINEERING	Robot	2	476	.0042	N	.0000

ENGINEERING	School	6	476	.0126	N	.0000
ENGINEERING	Science	8	476	.0168	Y	.0000
ENGINEERING	Solve	7	476	.0147	N	.0000
ENGINEERING	Stress	2	476	.0042	N	.0000
ENGINEERING	Structure	4	476	.0084	N	.0000
ENGINEERING	Student	3	476	.0063	N	.0000
ENGINEERING	Task	2	476	.0042	N	.0000
ENGINEERING	Technology	3	476	.0063	N	.0000
ENGINEERING	Tiring	2	476	.0042	N	.0000
ENGINEERING	Train	4	476	.0084	N	.0000
ENGINEERING	University	2	476	.0042	N	.0000
ENGINEERING	Useful	2	476	.0042	N	.0000
ENGINEERING	Vehicle	2	476	.0042	N	.0000
ENGINEERING	Wheel	2	476	.0042	N	.0000
ENGINEERING	Wrench	2	476	.0042	N	.0000
ECONOMICS	Accounting	2	485	.0041	N	.0000
ECONOMICS	Bank	2	485	.0041	N	.0000
ECONOMICS	Behaviour	2	485	.0041	N	.0000
ECONOMICS	Boring	4	485	.0082	N	.0000
ECONOMICS	Budget	2	485	.0041	N	.0000
ECONOMICS	Business	23	485	.0474	Y	.0000
ECONOMICS	Calculation	3	485	.0062	N	.0000
ECONOMICS	Confusing	3	485	.0062	N	.0000
ECONOMICS	Consumption	3	485	.0062	N	.0000
ECONOMICS	Country	3	485	.0062	N	.0000
ECONOMICS	Demand	5	485	.0103	N	.0000
ECONOMICS	Difficult	4	485	.0082	N	.0000
ECONOMICS	Distribution	2	485	.0041	N	.0000
ECONOMICS	Economy	25	485	.0515	N	.0000
ECONOMICS	Finance	11	485	.0227	N	.0000
ECONOMICS	Good	2	485	.0041	N	.0000
ECONOMICS	Government	2	485	.0041	N	.0000
ECONOMICS	Graph	5	485	.0103	N	.0000
ECONOMICS	Hate	2	485	.0041	N	.0000
ECONOMICS	Important	4	485	.0082	N	.0000
ECONOMICS	Income	2	485	.0041	N	.0000
ECONOMICS	Inflation	3	485	.0062	N	.0000
ECONOMICS	Market	8	485	.0165	N	.0000

ECONOMICS	Mathematics	31	485	.0639	Y	.0000
ECONOMICS	Money	189	485	.3897	N	.0000
ECONOMICS	Number	16	485	.0330	N	.0000
ECONOMICS	Politics	6	485	.0124	N	.0000
ECONOMICS	Production	2	485	.0041	N	.0000
ECONOMICS	Science	2	485	.0041	Y	.0000
ECONOMICS	Social	2	485	.0041	N	.0000
ECONOMICS	Society	4	485	.0082	N	.0000
ECONOMICS	Statistics	7	485	.0144	Y	.0000
ECONOMICS	Stock	12	485	.0247	N	.0000
ECONOMICS	Supply	6	485	.0124	N	.0000
ECONOMICS	Theory	3	485	.0062	N	.0000
ECONOMICS	Trend	2	485	.0041	N	.0000
ECONOMICS	Unsure	4	485	.0082	N	.0000
ECONOMICS	Wealth	4	485	.0082	N	.0000
ECONOMICS	World	4	485	.0082	N	.0000
AGRICULTURE	Animal	2	488	.0041	N	.0000
AGRICULTURE	Building	4	488	.0082	N	.0000
AGRICULTURE	Corn	10	488	.0205	N	.0000
AGRICULTURE	Cow	4	488	.0082	N	.0000
AGRICULTURE	Crop	17	488	.0348	N	.0000
AGRICULTURE	Culture	6	488	.0123	N	.0000
AGRICULTURE	Difficult	2	488	.0041	N	.0000
AGRICULTURE	Dirt	2	488	.0041	N	.0000
AGRICULTURE	Earth	4	488	.0082	N	.0000
AGRICULTURE	Ecosystem	2	488	.0041	N	.0000
AGRICULTURE	Enviornment	3	488	.0061	N	.0000
AGRICULTURE	Farm	170	488	.3484	N	.0000
AGRICULTURE	Farmer	12	488	.0246	N	.0000
AGRICULTURE	Field	10	488	.0205	N	.0000
AGRICULTURE	Food	75	488	.1537	N	.0000
AGRICULTURE	Fun	2	488	.0041	N	.0000
AGRICULTURE	Grass	9	488	.0184	N	.0000
AGRICULTURE	Green	3	488	.0061	N	.0000
AGRICULTURE	Grow	6	488	.0123	N	.0000
AGRICULTURE	Health	3	488	.0061	N	.0000
AGRICULTURE	Land	5	488	.0102	N	.0000
AGRICULTURE	Life	3	488	.0061	N	.0000

AGRICULTURE	Manure	2	488	.0041	N	.0000
AGRICULTURE	Nature	6	488	.0123	N	.0000
AGRICULTURE	Nutrient	2	488	.0041	N	.0000
AGRICULTURE	Plant	50	488	.1025	N	.0000
AGRICULTURE	Planting	5	488	.0102	N	.0000
AGRICULTURE	Science	2	488	.0041	Y	.0000
AGRICULTURE	Seed	3	488	.0061	N	.0000
AGRICULTURE	Soil	2	488	.0041	N	.0000
AGRICULTURE	Tree	2	488	.0041	N	.0000
AGRICULTURE	Unsure	2	488	.0041	N	.0000
AGRICULTURE	Vegetable	4	488	.0082	N	.0000
AGRICULTURE	Wheat	3	488	.0061	N	.0000
LAW	Argue	3	484	.0062	N	.0000
LAW	Bar	2	484	.0041	N	.0000
LAW	Book	13	484	.0269	N	.0000
LAW	Case	5	484	.0103	N	.0000
LAW	Charter	2	484	.0041	N	.0000
LAW	Class	2	484	.0041	N	.0000
LAW	Code	3	484	.0062	N	.0000
LAW	Complicated	2	484	.0041	N	.0000
LAW	Corrupt	2	484	.0041	N	.0000
LAW	Court	54	484	.1116	N	.0000
LAW	Courthouse	2	484	.0041	N	.0000
LAW	Courtroom	4	484	.0083	N	.0000
LAW	Crime	12	484	.0248	N	.0000
LAW	Criminal	11	484	.0227	N	.0000
LAW	Difficult	2	484	.0041	N	.0000
LAW	Enforcement	4	484	.0083	N	.0000
LAW	Ethics	3	484	.0062	N	.0000
LAW	Gavel	2	484	.0041	N	.0000
LAW	Government	2	484	.0041	N	.0000
LAW	Guilty	2	484	.0041	N	.0000
LAW	Injustice	3	484	.0062	N	.0000
LAW	Intelligent	3	484	.0062	N	.0000
LAW	Intereting	2	484	.0041	N	.0000
LAW	Jail	8	484	.0165	N	.0000
LAW	Judge	16	484	.0331	N	.0000
LAW	Judgement	2	484	.0041	N	.0000

LAW	Jury	5	484	.0103	N	.0000
LAW	Justice	50	484	.1033	N	.0000
LAW	Lawyer	61	484	.1260	N	.0000
LAW	Legal	4	484	.0083	N	.0000
LAW	Legally Blonde	2	484	.0041	N	.0000
LAW	Lsat	3	484	.0062	N	.0000
LAW	Necessary	2	484	.0041	N	.0000
LAW	Order	33	484	.0682	N	.0000
LAW	Police	13	484	.0269	N	.0000
LAW	Protection	4	484	.0083	N	.0000
LAW	Read	3	484	.0062	N	.0000
LAW	Regulation	3	484	.0062	N	.0000
LAW	Right	5	484	.0103	N	.0000
LAW	Rule	30	484	.0620	N	.0000
LAW	School	8	484	.0165	N	.0000
LAW	Society	3	484	.0062	N	.0000
LAW	Study	2	484	.0041	N	.0000
LAW	Suit	7	484	.0145	N	.0000
LAW	System	2	484	.0041	N	.0000
LAW	Word	2	484	.0041	N	.0000
PSYCHIATRY	Back	2	480	.0042	N	.0000
PSYCHIATRY	Behaviour	4	480	.0083	N	.0000
PSYCHIATRY	Body	3	480	.0063	N	.0000
PSYCHIATRY	Brain	16	480	.0333	N	.0000
PSYCHIATRY	Care	2	480	.0042	N	.0000
PSYCHIATRY	Chair	3	480	.0063	N	.0000
PSYCHIATRY	Clinical	3	480	.0063	N	.0000
PSYCHIATRY	Confusing	3	480	.0063	N	.0000
PSYCHIATRY	Couch	3	480	.0063	N	.0000
PSYCHIATRY	Counsel	3	480	.0063	N	.0000
PSYCHIATRY	Crazy	20	480	.0417	N	.0000
PSYCHIATRY	Depression	7	480	.0146	N	.0000
PSYCHIATRY	Diagnosis	6	480	.0125	N	.0000
PSYCHIATRY	Disorder	2	480	.0042	N	.0000
PSYCHIATRY	Doctor	20	480	.0417	N	.0000
PSYCHIATRY	Drug	10	480	.0208	N	.0000
PSYCHIATRY	Feeling	2	480	.0042	N	.0000
PSYCHIATRY	Health	6	480	.0125	N	.0000

PSYCHIATRY	Help	50	480	.1042	N	.0000
PSYCHIATRY	Hospital	4	480	.0083	N	.0000
PSYCHIATRY	Illness	6	480	.0125	N	.0000
PSYCHIATRY	Insane	2	480	.0042	N	.0000
PSYCHIATRY	Intelligent	3	480	.0063	N	.0000
PSYCHIATRY	Interesting	5	480	.0104	N	.0000
PSYCHIATRY	Medicine	35	480	.0729	Y	.0000
PSYCHIATRY	Mental	30	480	.0625	N	.0000
PSYCHIATRY	Mental Disability	2	480	.0042	N	.0000
PSYCHIATRY	Mental Disorder	5	480	.0104	N	.0000
PSYCHIATRY	Mental Health	19	480	.0396	N	.0000
PSYCHIATRY	Mental Illness	15	480	.0313	N	.0000
PSYCHIATRY	Mind	23	480	.0479	N	.0000
PSYCHIATRY	Office	2	480	.0042	N	.0000
PSYCHIATRY	Patient	13	480	.0271	N	.0000
PSYCHIATRY	People	5	480	.0104	N	.0000
PSYCHIATRY	Pill	5	480	.0104	N	.0000
PSYCHIATRY	Prescription	5	480	.0104	N	.0000
PSYCHIATRY	Problem	3	480	.0063	N	.0000
PSYCHIATRY	Psychiatrist	2	480	.0042	N	.0000
PSYCHIATRY	Psycho	2	480	.0042	N	.0000
PSYCHIATRY	Psychology	10	480	.0208	Y	.0000
PSYCHIATRY	School	2	480	.0042	N	.0000
PSYCHIATRY	Science	2	480	.0042	Y	.0000
PSYCHIATRY	Shrink	3	480	.0063	N	.0000
PSYCHIATRY	Sick	2	480	.0042	N	.0000
PSYCHIATRY	Talk	3	480	.0063	N	.0000
PSYCHIATRY	Therapist	6	480	.0125	N	.0000
PSYCHIATRY	Therapy	14	480	.0292	N	.0000
PSYCHIATRY	Think	5	480	.0104	N	.0000
PSYCHIATRY	Treatment	11	480	.0229	N	.0000
PSYCHIATRY	Unsure	10	480	.0208	N	.0000
GEOGRAPHY	Boring	5	487	.0103	N	.0000
GEOGRAPHY	Canada	9	487	.0185	N	.0000
GEOGRAPHY	Class	2	487	.0041	N	.0000
GEOGRAPHY	Continent	2	487	.0041	N	.0000
GEOGRAPHY	Country	23	487	.0472	N	.0000
GEOGRAPHY	Earth	50	487	.1027	N	.0000

GEOGRAPHY	Environment	2	487	.0041	N	.0000
GEOGRAPHY	Explore	2	487	.0041	N	.0000
GEOGRAPHY	Formation	2	487	.0041	N	.0000
GEOGRAPHY	Global	3	487	.0062	N	.0000
GEOGRAPHY	Globe	12	487	.0246	N	.0000
GEOGRAPHY	Highschool	2	487	.0041	N	.0000
GEOGRAPHY	Knowledgeable	2	487	.0041	N	.0000
GEOGRAPHY	Land	34	487	.0698	N	.0000
GEOGRAPHY	Landscape	6	487	.0123	N	.0000
GEOGRAPHY	Location	15	487	.0308	N	.0000
GEOGRAPHY	Map	149	487	.3060	N	.0000
GEOGRAPHY	Mountain	5	487	.0103	N	.0000
GEOGRAPHY	Ocean	4	487	.0082	N	.0000
GEOGRAPHY	Place	13	487	.0267	N	.0000
GEOGRAPHY	Planet	7	487	.0144	N	.0000
GEOGRAPHY	Province	2	487	.0041	N	.0000
GEOGRAPHY	Rock	9	487	.0185	N	.0000
GEOGRAPHY	Travel	10	487	.0205	N	.0000
GEOGRAPHY	World	74	487	.1520	N	.0000
ARCHAEOLOGY	Ancient	11	479	.0230	N	.0000
ARCHAEOLOGY	Arch	2	479	.0042	N	.0000
ARCHAEOLOGY	Artifact	12	479	.0251	N	.0000
ARCHAEOLOGY	Bone	84	479	.1754	N	.0000
ARCHAEOLOGY	Cave	2	479	.0042	N	.0000
ARCHAEOLOGY	Confusing	2	479	.0042	N	.0000
ARCHAEOLOGY	Dig	24	479	.0501	N	.0000
ARCHAEOLOGY	Dinosaur	66	479	.1378	N	.0000
ARCHAEOLOGY	Dirt	8	479	.0167	N	.0000
ARCHAEOLOGY	Discover	10	479	.0209	N	.0000
ARCHAEOLOGY	Egypt	3	479	.0063	N	.0000
ARCHAEOLOGY	Evolution	2	479	.0042	N	.0000
ARCHAEOLOGY	Explore	3	479	.0063	N	.0000
ARCHAEOLOGY	Finding	3	479	.0063	N	.0000
ARCHAEOLOGY	Fossil	64	479	.1336	N	.0000
ARCHAEOLOGY	Fun	2	479	.0042	N	.0000
ARCHAEOLOGY	Ground	2	479	.0042	N	.0000
ARCHAEOLOGY	History	39	479	.0814	Y	.0000
ARCHAEOLOGY	Human	3	479	.0063	N	.0000

ARCHAEOLOGY	Indiana Jones	6	479	.0125	N	.0000
ARCHAEOLOGY	Interesting	2	479	.0042	N	.0000
ARCHAEOLOGY	Mummy	2	479	.0042	N	.0000
ARCHAEOLOGY	Museum	2	479	.0042	N	.0000
ARCHAEOLOGY	Old	13	479	.0271	N	.0000
ARCHAEOLOGY	Past	9	479	.0188	N	.0000
ARCHAEOLOGY	Prehistoric	2	479	.0042	N	.0000
ARCHAEOLOGY	Pyramid	4	479	.0084	N	.0000
ARCHAEOLOGY	Rock	30	479	.0626	N	.0000
ARCHAEOLOGY	Ruin	2	479	.0042	N	.0000
ARCHAEOLOGY	School	2	479	.0042	N	.0000
ARCHAEOLOGY	Skeleton	2	479	.0042	N	.0000
ARCHAEOLOGY	Stone	3	479	.0063	N	.0000
ARCHAEOLOGY	Unsure	9	479	.0188	N	.0000
ANTHROPOLOGY	Ancestor	5	476	.0105	N	.0000
ANTHROPOLOGY	Ancient	2	476	.0042	N	.0000
ANTHROPOLOGY	Animal	4	476	.0084	N	.0000
ANTHROPOLOGY	Ape	7	476	.0147	N	.0000
ANTHROPOLOGY	Behaviour	3	476	.0063	N	.0000
ANTHROPOLOGY	Body	3	476	.0063	N	.0000
ANTHROPOLOGY	Bone	17	476	.0357	N	.0000
ANTHROPOLOGY	Book	3	476	.0063	N	.0000
ANTHROPOLOGY	Boring	3	476	.0063	N	.0000
ANTHROPOLOGY	Brain	3	476	.0063	N	.0000
ANTHROPOLOGY	Cavemen	3	476	.0063	N	.0000
ANTHROPOLOGY	Civilization	3	476	.0063	N	.0000
ANTHROPOLOGY	Class	2	476	.0042	N	.0000
ANTHROPOLOGY	Culture	84	476	.1765	N	.0000
ANTHROPOLOGY	Darwin	2	476	.0042	N	.0000
ANTHROPOLOGY	Development	2	476	.0042	N	.0000
ANTHROPOLOGY	Dig	2	476	.0042	N	.0000
ANTHROPOLOGY	Environment	2	476	.0042	N	.0000
ANTHROPOLOGY	Evolution	17	476	.0357	N	.0000
ANTHROPOLOGY	History	17	476	.0357	Y	.0000
ANTHROPOLOGY	Homosapien	2	476	.0042	N	.0000
ANTHROPOLOGY	Human	67	476	.1408	N	.0000
ANTHROPOLOGY	Humanities	9	476	.0189	Y	.0000
ANTHROPOLOGY	Humankind	11	476	.0231	N	.0000

ANTHROPOLOGY	Insect	2	476	.0042	N	.0000
ANTHROPOLOGY	Interaction	2	476	.0042	N	.0000
ANTHROPOLOGY	Interesting	2	476	.0042	N	.0000
ANTHROPOLOGY	Language	2	476	.0042	N	.0000
ANTHROPOLOGY	Life	2	476	.0042	N	.0000
ANTHROPOLOGY	Mind	3	476	.0063	N	.0000
ANTHROPOLOGY	Monkey	7	476	.0147	N	.0000
ANTHROPOLOGY	Nature	3	476	.0063	N	.0000
ANTHROPOLOGY	Neanderthal	3	476	.0063	N	.0000
ANTHROPOLOGY	Old	3	476	.0063	N	.0000
ANTHROPOLOGY	Origin	2	476	.0042	N	.0000
ANTHROPOLOGY	Past	3	476	.0063	N	.0000
ANTHROPOLOGY	People	55	476	.1155	N	.0000
ANTHROPOLOGY	Person	2	476	.0042	N	.0000
ANTHROPOLOGY	Population	3	476	.0063	N	.0000
ANTHROPOLOGY	Religion	2	476	.0042	N	.0000
ANTHROPOLOGY	Research	2	476	.0042	N	.0000
ANTHROPOLOGY	School	2	476	.0042	N	.0000
ANTHROPOLOGY	Science	4	476	.0084	Y	.0000
ANTHROPOLOGY	Social	2	476	.0042	N	.0000
ANTHROPOLOGY	Society	11	476	.0231	N	.0000
ANTHROPOLOGY	Sociology	5	476	.0105	Y	.0000
ANTHROPOLOGY	Spider	2	476	.0042	N	.0000
ANTHROPOLOGY	Study	3	476	.0063	N	.0000
ANTHROPOLOGY	Thought	2	476	.0042	N	.0000
ANTHROPOLOGY	Tribe	2	476	.0042	N	.0000
ANTHROPOLOGY	Unsure	4	476	.0084	N	.0000
SOCIOLOGY	Behaviour	10	481	.0208	N	.0000
SOCIOLOGY	Boring	3	481	.0062	N	.0000
SOCIOLOGY	Change	2	481	.0042	N	.0000
SOCIOLOGY	City	2	481	.0042	N	.0000
SOCIOLOGY	Class	5	481	.0104	N	.0000
SOCIOLOGY	Communicate	2	481	.0042	N	.0000
SOCIOLOGY	Community	4	481	.0083	N	.0000
SOCIOLOGY	Connection	2	481	.0042	N	.0000
SOCIOLOGY	Culture	8	481	.0166	N	.0000
SOCIOLOGY	Durkheim	2	481	.0042	N	.0000
SOCIOLOGY	Family	2	481	.0042	N	.0000

SOCIOLOGY	Functionalism	2	481	.0042	N	.0000
SOCIOLOGY	Group	23	481	.0478	N	.0000
SOCIOLOGY	Human	8	481	.0166	N	.0000
SOCIOLOGY	Interaction	30	481	.0624	N	.0000
SOCIOLOGY	Interesting	3	481	.0062	N	.0000
SOCIOLOGY	Issue	2	481	.0042	N	.0000
SOCIOLOGY	Life	3	481	.0062	N	.0000
SOCIOLOGY	Marx	5	481	.0104	N	.0000
SOCIOLOGY	Norm	3	481	.0062	N	.0000
SOCIOLOGY	People	91	481	.1892	N	.0000
SOCIOLOGY	Psychology	5	481	.0104	Y	.0000
SOCIOLOGY	Relationship	7	481	.0146	N	.0000
SOCIOLOGY	Science	4	481	.0083	Y	.0000
SOCIOLOGY	Social	31	481	.0644	N	.0000
SOCIOLOGY	Social Work	4	481	.0083	N	.0000
SOCIOLOGY	Socialize	2	481	.0042	N	.0000
SOCIOLOGY	Society	134	481	.2786	N	.0000
SOCIOLOGY	Structure	2	481	.0042	N	.0000
SOCIOLOGY	Survey	2	481	.0042	N	.0000
SOCIOLOGY	Talk	3	481	.0062	N	.0000
SOCIOLOGY	Theory	3	481	.0062	N	.0000
SOCIOLOGY	Understanding	2	481	.0042	N	.0000
SOCIOLOGY	Unsure	2	481	.0042	N	.0000
SOCIOLOGY	Value	2	481	.0042	N	.0000
HISTORY	Ancestor	6	480	.0125	N	.0000
HISTORY	Ancient	10	480	.0208	N	.0000
HISTORY	Awesome	2	480	.0042	N	.0000
HISTORY	Bias	2	480	.0042	N	.0000
HISTORY	Book	18	480	.0375	N	.0000
HISTORY	Boring	11	480	.0229	N	.0000
HISTORY	Class	3	480	.0063	N	.0000
HISTORY	Columbus	2	480	.0042	N	.0000
HISTORY	Date	5	480	.0104	N	.0000
HISTORY	Elderly	4	480	.0083	N	.0000
HISTORY	Empire	2	480	.0042	N	.0000
HISTORY	Europe	4	480	.0083	N	.0000
HISTORY	Event	6	480	.0125	N	.0000
HISTORY	Experience	2	480	.0042	N	.0000

HISTORY	Fact	6	480	.0125	N	.0000
HISTORY	Fun	2	480	.0042	N	.0000
HISTORY	Hitler	6	480	.0125	N	.0000
HISTORY	Holocaust	2	480	.0042	N	.0000
HISTORY	Important	6	480	.0125	N	.0000
HISTORY	Interesting	7	480	.0146	N	.0000
HISTORY	King	2	480	.0042	N	.0000
HISTORY	Knowledge	4	480	.0083	N	.0000
HISTORY	Learn	3	480	.0063	N	.0000
HISTORY	Lesson	5	480	.0104	N	.0000
HISTORY	Life	2	480	.0042	N	.0000
HISTORY	Medieval	2	480	.0042	N	.0000
HISTORY	Memory	5	480	.0104	N	.0000
HISTORY	Mistake	3	480	.0063	N	.0000
HISTORY	Museum	2	480	.0042	N	.0000
HISTORY	Native	2	480	.0042	N	.0000
HISTORY	Old	23	480	.0479	N	.0000
HISTORY	Past	123	480	.2563	N	.0000
HISTORY	President	2	480	.0042	N	.0000
HISTORY	Read	3	480	.0063	N	.0000
HISTORY	Renaissance	2	480	.0042	N	.0000
HISTORY	School	2	480	.0042	N	.0000
HISTORY	Slavery	3	480	.0063	N	.0000
HISTORY	Story	6	480	.0125	N	.0000
HISTORY	Text	2	480	.0042	N	.0000
HISTORY	Textbook	6	480	.0125	N	.0000
HISTORY	Time	11	480	.0229	N	.0000
HISTORY	Timeline	3	480	.0063	N	.0000
HISTORY	Understanding	2	480	.0042	N	.0000
HISTORY	Useless	2	480	.0042	N	.0000
HISTORY	War	85	480	.1771	N	.0000
MATHEMATICS	2+2	2	481	.0042	N	.0000
MATHEMATICS	Addition	11	481	.0229	N	.0000
MATHEMATICS	Algebra	16	481	.0333	N	.0000
MATHEMATICS	Arithmatic	2	481	.0042	N	.0000
MATHEMATICS	Arithmetic	2	481	.0042	N	.0000
MATHEMATICS	Awful	2	481	.0042	N	.0000
MATHEMATICS	Boring	4	481	.0083	N	.0000

MATHEMATICS	Calculation	15	481	.0312	N	.0000
MATHEMATICS	Calculator	9	481	.0187	N	.0000
MATHEMATICS	Calculus	8	481	.0166	N	.0000
MATHEMATICS	Complex	4	481	.0083	N	.0000
MATHEMATICS	Complicated	3	481	.0062	N	.0000
MATHEMATICS	Confusing	2	481	.0042	N	.0000
MATHEMATICS	Difficult	34	481	.0707	N	.0000
MATHEMATICS	Division	3	481	.0062	N	.0000
MATHEMATICS	Einstein	2	481	.0042	N	.0000
MATHEMATICS	Equation	47	481	.0977	N	.0000
MATHEMATICS	Everything	2	481	.0042	N	.0000
MATHEMATICS	Fail	2	481	.0042	N	.0000
MATHEMATICS	Formula	11	481	.0229	N	.0000
MATHEMATICS	Fun	4	481	.0083	N	.0000
MATHEMATICS	Hate	4	481	.0083	N	.0000
MATHEMATICS	Highschool	2	481	.0042	N	.0000
MATHEMATICS	Impossible	2	481	.0042	N	.0000
MATHEMATICS	Intelligent	5	481	.0104	N	.0000
MATHEMATICS	Logic	4	481	.0083	N	.0000
MATHEMATICS	Multiplication	7	481	.0146	N	.0000
MATHEMATICS	Number	163	481	.3389	N	.0000
MATHEMATICS	Paper	2	481	.0042	N	.0000
MATHEMATICS	Parabola	2	481	.0042	N	.0000
MATHEMATICS	Problem	7	481	.0146	N	.0000
MATHEMATICS	Quadratic	2	481	.0042	N	.0000
MATHEMATICS	Science	2	481	.0042	Y	.0000
MATHEMATICS	Solve	3	481	.0062	N	.0000
MATHEMATICS	Statistics	6	481	.0125	Y	.1932
MATHEMATICS	Subtract	2	481	.0042	N	.0000
MATHEMATICS	Variable	2	481	.0042	N	.0000
MATHEMATICS	Y=Mx+B	3	481	.0062	N	.0000
PHILOSOPHY	Abstract	5	481	.0104	N	.0000
PHILOSOPHY	Analysis	2	481	.0042	N	.0000
PHILOSOPHY	Annoying	3	481	.0062	N	.0000
PHILOSOPHY	Argue	2	481	.0042	N	.0000
PHILOSOPHY	Aristotle	21	481	.0437	N	.0000
PHILOSOPHY	Belief	3	481	.0062	N	.0000
PHILOSOPHY	Book	9	481	.0187	N	.0000

PHILOSOPHY	Boring	9	481	.0187	N	.0000
PHILOSOPHY	Confusing	6	481	.0125	N	.0000
PHILOSOPHY	Deep	12	481	.0249	N	.0000
PHILOSOPHY	Easy	2	481	.0042	N	.0000
PHILOSOPHY	Elderly	3	481	.0062	N	.0000
PHILOSOPHY	Ethics	5	481	.0104	N	.0000
PHILOSOPHY	Existence	6	481	.0125	N	.0000
PHILOSOPHY	Freud	5	481	.0104	N	.0000
PHILOSOPHY	God	2	481	.0042	N	.0000
PHILOSOPHY	Greece	2	481	.0042	N	.0000
PHILOSOPHY	History	4	481	.0083	Y	.0000
PHILOSOPHY	Idea	7	481	.0146	N	.0000
PHILOSOPHY	Insight	3	481	.0062	N	.0000
PHILOSOPHY	Introspection	2	481	.0042	N	.0000
PHILOSOPHY	Kant	2	481	.0042	N	.0000
PHILOSOPHY	Knowledge	6	481	.0125	N	.0000
PHILOSOPHY	Life	13	481	.0270	N	.0000
PHILOSOPHY	Logic	6	481	.0125	N	.0000
PHILOSOPHY	Meaning	12	481	.0249	N	.0000
PHILOSOPHY	Mind	10	481	.0208	N	.0000
PHILOSOPHY	Mindblown	2	481	.0042	N	.0000
PHILOSOPHY	Modern	2	481	.0042	N	.0000
PHILOSOPHY	Moral	3	481	.0062	N	.0000
PHILOSOPHY	No	2	481	.0042	N	.0000
PHILOSOPHY	Open-Minded	4	481	.0083	N	.0000
PHILOSOPHY	Opinion	2	481	.0042	N	.0000
PHILOSOPHY	Perception	3	481	.0062	N	.0000
PHILOSOPHY	Philosopher	2	481	.0042	N	.0000
PHILOSOPHY	Plato	15	481	.0312	N	.0000
PHILOSOPHY	Ponder	5	481	.0104	N	.0000
PHILOSOPHY	Problem	3	481	.0062	N	.0000
PHILOSOPHY	Question	15	481	.0312	N	.0000
PHILOSOPHY	Rational	2	481	.0042	N	.0000
PHILOSOPHY	Reality	3	481	.0062	N	.0000
PHILOSOPHY	Reason	3	481	.0062	N	.0000
PHILOSOPHY	Religion	8	481	.0166	N	.0000
PHILOSOPHY	Socrates	18	481	.0374	N	.0000
PHILOSOPHY	Stupid	2	481	.0042	N	.0000

PHILOSOPHY	Talk	2	481	.0042	N	.0000
PHILOSOPHY	Theory	35	481	.0728	N	.0000
PHILOSOPHY	Think	38	481	.0790	N	.0000
PHILOSOPHY	Thought	27	481	.0561	N	.0000
PHILOSOPHY	Understanding	2	481	.0042	N	.0000
PHILOSOPHY	Unknown	2	481	.0042	N	.0000
PHILOSOPHY	Useless	2	481	.0042	N	.0000
PHILOSOPHY	View	2	481	.0042	N	.0000
PHILOSOPHY	What	4	481	.0083	N	.0000
PHILOSOPHY	Why	6	481	.0125	N	.0000
PHILOSOPHY	Wisdom	6	481	.0125	N	.0000
PHILOSOPHY	Wise	6	481	.0125	N	.0000
PHILOSOPHY	Wonder	4	481	.0083	N	.0000
THEOLOGY	Art	2	477	.0042	Y	.0000
THEOLOGY	Belief	6	477	.0126	N	.0000
THEOLOGY	Bible	7	477	.0147	N	.0000
THEOLOGY	Book	5	477	.0105	N	.0000
THEOLOGY	Boring	2	477	.0042	N	.0000
THEOLOGY	Buddhism	2	477	.0042	N	.0000
THEOLOGY	Christian	4	477	.0084	N	.0000
THEOLOGY	Church	4	477	.0084	N	.0000
THEOLOGY	Concept	2	477	.0042	N	.0000
THEOLOGY	Confusing	4	477	.0084	N	.0000
THEOLOGY	Culture	2	477	.0042	N	.0000
THEOLOGY	Difficult	2	477	.0042	N	.0000
THEOLOGY	Easy	2	477	.0042	N	.0000
THEOLOGY	Faith	2	477	.0042	N	.0000
THEOLOGY	False	0	477	.0000	N	.0000
THEOLOGY	God	93	477	.1950	N	.0000
THEOLOGY	Greek	4	477	.0084	N	.0000
THEOLOGY	Hypothesis	3	477	.0063	N	.0000
THEOLOGY	Idea	3	477	.0063	N	.0000
THEOLOGY	Interesting	7	477	.0147	N	.0000
THEOLOGY	Introspection	2	477	.0042	N	.0000
THEOLOGY	Jesus	4	477	.0084	N	.0000
THEOLOGY	Life	2	477	.0042	N	.0000
THEOLOGY	Myth	2	477	.0042	N	.0000
THEOLOGY	Mythology	2	477	.0042	N	.0000

THEOLOGY	Nature	4	477	.0084	N	.0000
THEOLOGY	Nothing	3	477	.0063	N	.0000
THEOLOGY	Philosophy	2	477	.0042	Y	.0000
THEOLOGY	Polytheism	2	477	.0042	N	.0000
THEOLOGY	Religion	95	477	.1992	N	.0000
THEOLOGY	Roman	2	477	.0042	N	.0000
THEOLOGY	School	2	477	.0042	N	.0000
THEOLOGY	Theo	3	477	.0063	N	.0000
THEOLOGY	Theory	63	477	.1321	N	.0000
THEOLOGY	Think	5	477	.0105	N	.0000
THEOLOGY	Thought	4	477	.0084	N	.0000
THEOLOGY	Unknown	4	477	.0084	N	.0000
THEOLOGY	Unsure	34	477	.0713	N	.0000
THEOLOGY	Useless	4	477	.0084	N	.0000
THEOLOGY	What	4	477	.0084	N	.0000
THEOLOGY	Words	2	477	.0042	N	.0000
LINGUISTICS	Aspect	2	485	.0041	N	.0000
LINGUISTICS	Boring	2	485	.0041	N	.0000
LINGUISTICS	Communcation	16	485	.0330	N	.0000
LINGUISTICS	Complicated	2	485	.0041	N	.0000
LINGUISTICS	Culture	2	485	.0041	N	.0000
LINGUISTICS	Difficult	2	485	.0041	N	.0000
LINGUISTICS	English	21	485	.0433	N	.0000
LINGUISTICS	Esl	2	485	.0041	N	.0000
LINGUISTICS	French	4	485	.0082	N	.0000
LINGUISTICS	Grammar	2	485	.0041	N	.0000
LINGUISTICS	Interesting	2	485	.0041	N	.0000
LINGUISTICS	Langauge	252	485	.5196	N	.0000
LINGUISTICS	Language	3	485	.0062	N	.0000
LINGUISTICS	Meaning	2	485	.0041	N	.0000
LINGUISTICS	Number	2	485	.0041	N	.0000
LINGUISTICS	Phoneme	3	485	.0062	N	.0000
LINGUISTICS	Phonetic	3	485	.0062	N	.0000
LINGUISTICS	Semantic	2	485	.0041	N	.0000
LINGUISTICS	Sign	4	485	.0082	N	.0000
LINGUISTICS	Sound	2	485	.0041	N	.0000
LINGUISTICS	Spanish	2	485	.0041	N	.0000
LINGUISTICS	Speak	10	485	.0206	N	.0000

LINGUISTICS	Speech	16	485	.0330	N	.0000
LINGUISTICS	Syntax	2	485	.0041	N	.0000
LINGUISTICS	Talk	9	485	.0186	N	.0000
LINGUISTICS	Tongue	7	485	.0144	N	.0000
LINGUISTICS	Unsure	6	485	.0124	N	.0000
LINGUISTICS	Word	43	485	.0887	N	.0000
LINGUISTICS	Write	2	485	.0041	N	.0000
MUSIC	Amazing	2	486	.0041	N	.0000
MUSIC	Art	46	486	.0947	Y	.0000
MUSIC	Awesome	2	486	.0041	N	.0000
MUSIC	Band	3	486	.0062	N	.0000
MUSIC	Beat	4	486	.0082	N	.0000
MUSIC	Beauty	8	486	.0165	N	.0000
MUSIC	Beethoven	2	486	.0041	N	.0000
MUSIC	Beyonce	2	486	.0041	N	.0000
MUSIC	Calm	3	486	.0062	N	.0000
MUSIC	Compose	2	486	.0041	N	.0000
MUSIC	Composer	2	486	.0041	N	.0000
MUSIC	Concert	3	486	.0062	N	.0000
MUSIC	Country	4	486	.0082	N	.0000
MUSIC	Creative	6	486	.0123	N	.0000
MUSIC	Culture	3	486	.0062	N	.0000
MUSIC	Dance	5	486	.0103	N	.0000
MUSIC	Emotion	4	486	.0082	N	.0000
MUSIC	Entertainment	2	486	.0041	N	.0000
MUSIC	Express	11	486	.0226	N	.0000
MUSIC	Feeling	2	486	.0041	N	.0000
MUSIC	Festival	2	486	.0041	N	.0000
MUSIC	Flute	3	486	.0062	N	.0000
MUSIC	Freedom	2	486	.0041	N	.0000
MUSIC	Fun	6	486	.0123	N	.0000
MUSIC	Genre	2	486	.0041	N	.0000
MUSIC	Guitar	16	486	.0329	N	.0000
MUSIC	Happy	5	486	.0103	N	.0000
MUSIC	Harmony	2	486	.0041	N	.0000
MUSIC	Headphones	2	486	.0041	N	.0000
MUSIC	Hiphop	6	486	.0123	N	.0000
MUSIC	Instrument	25	486	.0514	N	.0000

MUSIC	Life	4	486	.0082	N	.0000
MUSIC	Listen	5	486	.0103	N	.0000
MUSIC	Love	8	486	.0165	N	.0000
MUSIC	Melody	2	486	.0041	N	.0000
MUSIC	Mozart	2	486	.0041	N	.0000
MUSIC	Nice	2	486	.0041	N	.0000
MUSIC	Noise	2	486	.0041	N	.0000
MUSIC	Note	48	486	.0988	N	.0000
MUSIC	Passion	5	486	.0103	N	.0000
MUSIC	Piano	10	486	.0206	N	.0000
MUSIC	Play	3	486	.0062	N	.0000
MUSIC	Poetry	2	486	.0041	N	.0000
MUSIC	Pop	4	486	.0082	N	.0000
MUSIC	Radio	4	486	.0082	N	.0000
MUSIC	Rap	6	486	.0123	N	.0000
MUSIC	Relax	2	486	.0041	N	.0000
MUSIC	Rhythm	4	486	.0082	N	.0000
MUSIC	Rock	3	486	.0062	N	.0000
MUSIC	Saxophone	2	486	.0041	N	.0000
MUSIC	Sing	6	486	.0123	N	.0000
MUSIC	Soca	2	486	.0041	N	.0000
MUSIC	Song	31	486	.0638	N	.0000
MUSIC	Sooth	2	486	.0041	N	.0000
MUSIC	Soul	2	486	.0041	N	.0000
MUSIC	Sound	45	486	.0926	N	.0000
MUSIC	Symphony	2	486	.0041	N	.0000
MUSIC	Talent	5	486	.0103	N	.0000
MUSIC	Trebble	2	486	.0041	N	.0000
MUSIC	Trumpet	2	486	.0041	N	.0000
MUSIC	Tune	3	486	.0062	N	.0000
MUSIC	Violin	4	486	.0082	N	.0000
COMPUTING	Ai	4	482	.0083	N	.0000
COMPUTING	Algorithm	3	482	.0062	N	.0000
COMPUTING	Binary	4	482	.0083	N	.0000
COMPUTING	Boring	5	482	.0104	N	.0000
COMPUTING	Calculation	3	482	.0062	N	.0000
COMPUTING	Chip	2	482	.0041	N	.0000
COMPUTING	Code	50	482	.1037	N	.0000

COMPUTING	Cognition	2	482	.0041	N	.0000
COMPUTING	Compute	2	482	.0041	N	.0000
COMPUTING	Computer	93	482	.1929	N	.0000
COMPUTING	Confusing	2	482	.0041	N	.0000
COMPUTING	Data	2	482	.0041	N	.0000
COMPUTING	Difficult	7	482	.0145	N	.0000
COMPUTING	Digital	2	482	.0041	N	.0000
COMPUTING	Easy	2	482	.0041	N	.0000
COMPUTING	Electronic	6	482	.0124	N	.0000
COMPUTING	Fun	3	482	.0062	N	.0000
COMPUTING	Future	6	482	.0124	N	.0000
COMPUTING	Game	15	482	.0311	N	.0000
COMPUTING	Geek	2	482	.0041	N	.0000
COMPUTING	Hacking	2	482	.0041	N	.0000
COMPUTING	Intelligent	3	482	.0062	N	.0000
COMPUTING	Interesting	2	482	.0041	N	.0000
COMPUTING	Internet	4	482	.0083	N	.0000
COMPUTING	It	3	482	.0062	N	.0000
COMPUTING	Keyboard	15	482	.0311	N	.0000
COMPUTING	Laptop	12	482	.0249	N	.0000
COMPUTING	Logic	3	482	.0062	N	.0000
COMPUTING	Mac	5	482	.0104	N	.0000
COMPUTING	Macbook	3	482	.0062	N	.0000
COMPUTING	Mathematics	13	482	.0270	Y	.0000
COMPUTING	Microsoft	2	482	.0041	N	.0000
COMPUTING	Modern	2	482	.0041	N	.0000
COMPUTING	Networking	2	482	.0041	N	.0000
COMPUTING	Number	7	482	.0145	N	.0000
COMPUTING	Operation	2	482	.0041	N	.0000
COMPUTING	Power	4	482	.0083	N	.0000
COMPUTING	Process	5	482	.0104	N	.0000
COMPUTING	Program	14	482	.0290	N	.0000
COMPUTING	Programming	28	482	.0581	N	.0000
COMPUTING	Science	12	482	.0249	Y	.0000
COMPUTING	Software	5	482	.0104	N	.0000
COMPUTING	Solve	4	482	.0083	N	.0000
COMPUTING	System	2	482	.0041	N	.0000
COMPUTING	Technology	38	482	.0788	N	.0000

COMPUTING	Think	3	482	.0062	N	.0000
COMPUTING	Type	7	482	.0145	N	.0000
COMPUTING	Understanding	2	482	.0041	N	.0000
COMPUTING	Waste	2	482	.0041	N	.0000
HUMANITIES	Art	3	484	.0062	Y	.0000
HUMANITIES	Behaviour	2	484	.0041	N	.0000
HUMANITIES	Book	7	484	.0145	N	.0000
HUMANITIES	Care	2	484	.0041	N	.0000
HUMANITIES	Civilization	3	484	.0062	N	.0000
HUMANITIES	Community	2	484	.0041	N	.0000
HUMANITIES	Compassion	2	484	.0041	N	.0000
HUMANITIES	Culture	20	484	.0413	N	.0000
HUMANITIES	Easy	4	484	.0083	N	.0000
HUMANITIES	Equality	4	484	.0083	N	.0000
HUMANITIES	Essay	2	484	.0041	N	.0000
HUMANITIES	Ethics	6	484	.0124	N	.0000
HUMANITIES	Help	11	484	.0227	N	.0000
HUMANITIES	History	3	484	.0062	Y	.0000
HUMANITIES	Human	89	484	.1839	N	.0000
HUMANITIES	Humanism	6	484	.0124	N	.0000
HUMANITIES	Humankind	11	484	.0227	N	.0000
HUMANITIES	Important	3	484	.0062	N	.0000
HUMANITIES	Interaction	2	484	.0041	N	.0000
HUMANITIES	Interesting	3	484	.0062	N	.0000
HUMANITIES	Joke	2	484	.0041	N	.0000
HUMANITIES	Justice	2	484	.0041	N	.0000
HUMANITIES	Kind	4	484	.0083	N	.0000
HUMANITIES	Liberal	2	484	.0041	N	.0000
HUMANITIES	Life	4	484	.0083	N	.0000
HUMANITIES	Literature	3	484	.0062	N	.0000
HUMANITIES	Moral	4	484	.0083	N	.0000
HUMANITIES	Nature	3	484	.0062	N	.0000
HUMANITIES	No	2	484	.0041	N	.0000
HUMANITIES	People	4	484	.0083	N	.0000
HUMANITIES	Person	62	484	.1281	N	.0000
HUMANITIES	Philosophy	2	484	.0041	Y	.0000
HUMANITIES	Psychology	3	484	.0062	Y	.0000
HUMANITIES	Race	2	484	.0041	N	.0000

HUMANITIES	Read	5	484	.0103	N	.0000
HUMANITIES	Right	52	484	.1074	N	.0000
HUMANITIES	Save	3	484	.0062	N	.0000
HUMANITIES	School	2	484	.0041	N	.0000
HUMANITIES	Science	7	484	.0145	Y	.0000
HUMANITIES	Social	5	484	.0103	N	.0000
HUMANITIES	Society	6	484	.0124	N	.0000
HUMANITIES	Sociology	2	484	.0041	Y	.0000
HUMANITIES	Study	6	484	.0124	N	.0000
HUMANITIES	Teach	2	484	.0041	N	.0000
HUMANITIES	Unsure	5	484	.0103	N	.0000
HUMANITIES	Write	3	484	.0062	N	.0000
CRIMINOLOGY	Behaviour	4	485	.0082	N	.0000
CRIMINOLOGY	Control	3	485	.0062	N	.0000
CRIMINOLOGY	Cool	2	485	.0041	N	.0000
CRIMINOLOGY	Court	2	485	.0041	N	.0000
CRIMINOLOGY	Crime	118	485	.2433	N	.0000
CRIMINOLOGY	Criminal	58	485	.1196	N	.0000
CRIMINOLOGY	Csi	6	485	.0124	N	.0000
CRIMINOLOGY	Detective	5	485	.0103	N	.0000
CRIMINOLOGY	Deviant	3	485	.0062	N	.0000
CRIMINOLOGY	Easy	2	485	.0041	N	.0000
CRIMINOLOGY	Favourite	2	485	.0041	N	.0000
CRIMINOLOGY	Forensic	10	485	.0206	N	.0000
CRIMINOLOGY	Gun	3	485	.0062	N	.0000
CRIMINOLOGY	Help	2	485	.0041	N	.0000
CRIMINOLOGY	Interesting	8	485	.0165	N	.0000
CRIMINOLOGY	Investigation	6	485	.0124	N	.0000
CRIMINOLOGY	Jail	13	485	.0268	N	.0000
CRIMINOLOGY	Judge	2	485	.0041	N	.0000
CRIMINOLOGY	Justice	18	485	.0371	N	.0000
CRIMINOLOGY	Law	87	485	.1794	Y	.0000
CRIMINOLOGY	Mind	5	485	.0103	N	.0000
CRIMINOLOGY	Motive	2	485	.0041	N	.0000
CRIMINOLOGY	Murder	5	485	.0103	N	.0000
CRIMINOLOGY	Mystery	2	485	.0041	N	.0000
CRIMINOLOGY	Police	40	485	.0825	N	.0000
CRIMINOLOGY	Prevention	2	485	.0041	N	.0000

CRIMINOLOGY	Psycho	2	485	.0041	N	.0000
CRIMINOLOGY	Psychology	2	485	.0041	Y	.0000
CRIMINOLOGY	Psychopathy	2	485	.0041	N	.0000
CRIMINOLOGY	School	2	485	.0041	N	.0000
CRIMINOLOGY	Study	5	485	.0103	N	.0000
CRIMINOLOGY	System	2	485	.0041	N	.0000
STATISTICS	Analysis	9	471	.0191	N	.0000
STATISTICS	Anova	2	471	.0042	N	.0000
STATISTICS	Awful	2	471	.0042	N	.0000
STATISTICS	Boring	7	471	.0149	N	.0000
STATISTICS	Calculation	7	471	.0149	N	.0000
STATISTICS	Chart	7	471	.0149	N	.0000
STATISTICS	Correlation	3	471	.0064	N	.0000
STATISTICS	Data	29	471	.0616	N	.0000
STATISTICS	Difficult	10	471	.0212	N	.0000
STATISTICS	Equation	3	471	.0064	N	.0000
STATISTICS	Fact	12	471	.0255	N	.0000
STATISTICS	Formula	2	471	.0042	N	.0000
STATISTICS	Fun	2	471	.0042	N	.0000
STATISTICS	Graph	34	471	.0722	N	.0000
STATISTICS	Hate	3	471	.0064	N	.0000
STATISTICS	Information	5	471	.0106	N	.0000
STATISTICS	Mathematics	91	471	.1932	Y	.0000
STATISTICS	Mean	2	471	.0042	N	.0000
STATISTICS	Number	103	471	.2187	N	.0000
STATISTICS	Percent	13	471	.0276	N	.0000
STATISTICS	Probability	10	471	.0212	N	.0000
STATISTICS	Psychology	4	471	.0085	Y	.0000
STATISTICS	Research	7	471	.0149	N	.0000
STATISTICS	Standard Deviation	3	471	.0064	N	.0000
STATISTICS	Status	2	471	.0042	N	.0000
STATISTICS	Stock	2	471	.0042	N	.0000
STATISTICS	Survey	4	471	.0085	N	.0000
STATISTICS	T-Test	3	471	.0064	N	.0000
STATISTICS	Trend	2	471	.0042	N	.0000
STATISTICS	Useful	3	471	.0064	N	.0000
NEUROSCIENCE	Advanced	2	474	.0042	N	.0000
NEUROSCIENCE	Anatomy	2	474	.0042	N	.0000

NEUROSCIENCE	Biology	2	474	.0042	Y	.0000
NEUROSCIENCE	Brain	311	474	.6561	N	.0000
NEUROSCIENCE	Cell	3	474	.0063	N	.0000
NEUROSCIENCE	Chemistry	2	474	.0042	Y	.0000
NEUROSCIENCE	Cognition	2	474	.0042	N	.0000
NEUROSCIENCE	Complicated	4	474	.0084	N	.0000
NEUROSCIENCE	Difficult	7	474	.0148	N	.0000
NEUROSCIENCE	Doctor	2	474	.0042	N	.0000
NEUROSCIENCE	Fascinating	2	474	.0042	N	.0000
NEUROSCIENCE	Food	2	474	.0042	N	.0000
NEUROSCIENCE	Health	2	474	.0042	N	.0000
NEUROSCIENCE	Hospital	2	474	.0042	N	.0000
NEUROSCIENCE	Intelligent	6	474	.0127	N	.0000
NEUROSCIENCE	Interesting	5	474	.0105	N	.0000
NEUROSCIENCE	Mental Health	2	474	.0042	N	.0000
NEUROSCIENCE	Mind	14	474	.0295	N	.0000
NEUROSCIENCE	Nerve	5	474	.0105	N	.0000
NEUROSCIENCE	Nervous System	5	474	.0105	N	.0000
NEUROSCIENCE	Neuron	14	474	.0295	N	.0000
NEUROSCIENCE	Neurotransmitter	2	474	.0042	N	.0000
NEUROSCIENCE	Psychology	8	474	.0169	Y	.0000
NEUROSCIENCE	Science	12	474	.0253	Y	.0000
NEUROSCIENCE	Small	2	474	.0042	N	.0000
NEUROSCIENCE	Stimulate	2	474	.0042	N	.0000
NEUROSCIENCE	Study	2	474	.0042	N	.0000
NEUROSCIENCE	Surgeon	3	474	.0063	N	.0000
NEUROSCIENCE	Understanding	4	474	.0084	N	.0000

Note: #P refers to the number of times the target was evoked for that cue. #G refers to the number of participants that responded to that cue. FSG refers to the cue to target strength (i.e., #P/#G=FSG). N refers to whether or not the associate was ever seen as a cue. BSG refers to the target to cue strength.

Appendix C: Number of Types of Associates Generated for Science and Psychology

Cue	Associate	Frequency Count	FSG	Semantic Category
Psychology	Mind	132	.2710	Topic
n = 487	Brain	116	.2382	Topic
	Behaviour	17	.0349	Topic
	Science	7	.0144	Topic
	People	6	.0123	Topic
	Mental	5	.0103	Topic
	Mental Health	5	.0103	Topic
	Cognition	4	.0082	Topic
	Personality	3	.0062	Topic
	Feeling	2	.0041	Topic
	Human	2	.0041	Topic
	Mental Illness	2	.0041	Topic
	Neuroscience	2	.0041	Topic
	Therapy	2	.0041	Topic
	Total Topic:	***305***		
	Textbook	2	.0041	Object
	Total Object:	***2***		
	Study	8	.0164	Method
	Think	8	.0164	Method
	Experiment	6	.0123	Method
	Thought	4	.0082	Method
	Understanding	4	.0082	Method
	Learn	3	.0062	Method
	Theory	3	.0062	Method
	Answer	2	.0041	Method
	Observant	2	.0041	Method
	Online	2	.0041	Method
	Research	2	.0041	Method
	Total Method:	***44***		
	Interesting	11	.0226	Other
	Freud	8	.0164	Other
	Class	5	.0103	Other
	Intelligent	5	.0103	Other
	Major	5	.0103	Other

	Complex	4	.0082	Other
	Doctor	4	.0082	Other
	School	4	.0082	Other
	Psychologist	3	.0062	Other
	Therapist	3	.0062	Other
	Boring	2	.0041	Other
	Confusing	2	.0041	Other
	Curiosity	2	.0041	Other
	Easy	2	.0041	Other
	Intuitive	2	.0041	Other
	Mystery	2	.0041	Other
	Necessary	2	.0041	Other
	Test	2	.0041	Other
	Total Other:	***68***		
Science	Biology	53	.1077	Topic
n = 492	Chemistry	42	.0854	Topic
	Technology	12	.0244	Topic
	Physics	9	.0183	Topic
	Space	7	.0142	Topic
	Medicine	6	.0122	Topic
	Future	4	.0081	Topic
	Logic	4	.0081	Topic
	Nature	4	.0081	Topic
	Fiction	3	.0061	Topic
	Life	3	.0061	Topic
	Neuroscience	3	.0061	Topic
	Universe	3	.0061	Topic
	Animal	2	.0041	Topic
	Atom	2	.0041	Topic
	Body	2	.0041	Topic
	Engineering	2	.0041	Topic
	Molecule	2	.0041	Topic
	Neuron	2	.0041	Topic
	Planet	2	.0041	Topic
	Total Topic:	***167***		
	Lab	34	.0691	Object
	Chemical	18	.0366	Object
	Brain	6	.0122	Object

Earth	6	.0122	Object
Beaker	5	.0102	Object
Computer	4	.0081	Object
Microscope	2	.0041	Object
Test Tube	2	.0041	Object
Total Object:	***77***		
Experiment	17	.0346	Method
Mathematics	14	.0285	Method
Research	10	.0203	Method
Discovery	7	.0142	Method
Theory	4	.0081	Method
Progress	3	.0061	Method
Think	3	.0061	Method
Explore	2	.0041	Method
Learn	2	.0041	Method
Project	2	.0041	Method
Study	2	.0041	Method
Total Method:	***66***		
Intelligent	34	.0691	Other
Difficult	19	.0386	Other
Knowledge	10	.0203	Other
Fact	8	.0163	Other
Interesting	7	.0142	Other
Einstein	5	.0102	Other
Nerd	4	.0081	Other
Academic	3	.0061	Other
Bill Nye	3	.0061	Other
Boring	3	.0061	Other
Complex	3	.0061	Other
Major	3	.0061	Other
Discipline	2	.0041	Other
Doctor	2	.0041	Other
Fascinating	2	.0041	Other
School	2	.0041	Other
Scientist	2	.0041	Other
Truth	2	.0041	Other
Total Other:	***114***		

Appendix D: Differences in Types of Associates Generated Between Those who Scored Above and Below the Median on the Scientific Literacy Questionnaire

Cues that Include the Target Associate "Science" for the Above Median Group

CUE	Include Science?	Frequency
Physics	Y	13
Chemistry	Y	11
Biology	Y	8
Computing	Y	8
Humanities	Y	6
Engineering	Y	4
Psychology	Y	3
Anthropology	Y	2
Neuroscience	Y	2
Art	Y	1
Mathematics	Y	1
Sociology	Y	1
Agriculture	N	0
Archaeology	N	0
Architecture	N	0
Astronomy	N	0
Business	N	0
Criminology	N	0
Economics	N	0
Geography	N	0
History	N	0
Law	N	0
Linguistics	N	0
Medicine	N	0
Music	N	0
Philosophy	N	0
Psychiatry	N	0
Science	N	0
Statistics	N	0
Theology	N	0

Cues that Include the Target Associate "Science" for the Below Median Group

CUE	Include Science?	Frequency
Physics	Y	19
Chemistry	Y	15
Neuroscience	Y	10
Biology	Y	8
Astronomy	Y	4
Computing	Y	4
Engineering	Y	4
Psychology	Y	4
Sociology	Y	3
Agriculture	Y	2
Anthropology	Y	2
Economics	Y	2
Psychiatry	Y	2
Archaeology	Y	1
Humanities	Y	1
Law	Y	1
Linguistics	Y	1
Mathematics	Y	1
Medicine	Y	1
Philosophy	Y	1
Statistics	Y	1
Theology	Y	1
Architecture	N	0
Art	N	0
Business	N	0
Criminology	N	0
Geography	N	0
History	N	0
Music	N	0
Science	N	0

Number of Types of Associates Generated for Science and Psychology for the Above Median Group

Cue	Topics	Objects	Methods	Other
Science	71	33	30	64
Psychology	145	0	19	34

Number of Types of Associates Generated for Science and Psychology for the Below Median Group

Cue	Topics	Objects	Methods	Other
Science	79	24	19	49
Psychology	131	5	8	35