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Integrative Complexity in Reasoning About
the Natural Environment:
An Investigation of Authoritarianism and Machiavellianism

Rachelle Thibodeau

Masters Thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfilment of the requirements for the degree
Master of Arts.

Department of Psychology

Carleton University

August 31, 1998

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of the thesis:

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the Natural Environment:
An Investigation of Authoritarianism and Machiavellianism

Submitted by Rachelle Thibodeau in partial fulfilment of the requirements
for the degree Master of Arts.

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August 31, 1998

Abstract

The present study explored the relationship between cognitive style, personality, and political ideology. Specifically, it examined the integrative cognitive complexity (Schroder, Driver, & Streufert, 1967) shown by participants as they solved hypothetical environmental dilemmas. The association of authoritarianism (e.g., Altemeyer, 1981, 1996) and Machiavellianism (e.g., Christie & Geis, 1970) to both integrative cognitive complexity and environmental attitudes was also examined.

One hundred thirty-nine undergraduate students wrote solutions to dilemmas pitting economic development against environmental concerns. Environmental concern (Dunlap & Van Liere, 1978), Right-Wing Authoritarianism (Altemeyer, 1996), and Machiavellianism (Christie & Geis, 1970) were also assessed.

Analysis of covariance revealed that high-authoritarian participants demonstrate less cognitive complexity than low authoritarians in their environmental problem solving. However, the cognitive complexity of high and low Machiavellians did not differ significantly. Findings are related to previous research on right-wing authoritarianism and Machiavellianism. Finally, speculation is entertained about potentially fruitful lines of further research.

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Integrative Complexity in Reasoning About the Natural Environment:

An Investigation of Authoritarianism and Machiavellianism

As the twentieth century comes to a close, the condition of our natural environment is drawing unprecedented concern from the scientific community. For their part, social psychologists have typically approached the study of the environment much as they have any other social issue--by investigating people's attitudes toward it.¹ The typical rationale for such investigations is that by improving our understanding of environmental attitudes, social psychologists can also contribute to improvements in environment-related behaviours such as recycling, transportation choices, and consumer behaviour.

In general, social psychologists study environmental attitudes by correlating people's attitudes toward the environment with other types of attitudes (e.g., Rasinski, Smith, & Zuckerbraun, 1994; cf, Axelrod, 1994) or with their environment-related (e.g., Finger, 1994; Scott & Willits, 1994; Mainieri, Barnett, Valddero, Unipan, & Oskamp, 1997) or political (e.g., Gebhardt & Lindsey, 1995) behaviour. Typically, this is done by correlating scores on an environmental-attitudes questionnaire with scores on other attitude questionnaires or with scores on self-report measures of behaviour.

Although self-report attitude and behaviour scales have an important place in the

¹Although there have been extensive critiques of the assumption of an attitude-behaviour link (e.g., Wicker, 1969, cited in Eagly, 1992), Eagly (1992) has asserted that some progress has been made in research based on this assumption (e.g., see Fishbein & Ajzen, 1975). Though the causal chain from attitude to action may be much more complex than early researchers supposed, there continues to be value in the study of their interrelation. Thus, the present study will operate on the assumption that there is an important, bi-directional tie between attitudes and behaviours toward the natural environment.

study of environmental issues, an alternative approach is to examine the types of solutions that people propose to environmental problems or dilemmas. An improved understanding of the kinds of environmental solutions people suggest can provide insight into the reasoning people use in considering this important social issue. The types of solutions people favour for environmental problems also have important practical implications: For groups advocating environmental protection, public support for proposed solutions is a key source of legitimacy in struggles for change at the levels of public policy (Stern, Dietz, & Guagnano, 1995, note 1) and individual behaviour. The types of solutions people favour for environmental problems, and especially the cognitive processes by which they arrive at these solutions, is a central focus of the present study. Moreover, because this study is theoretically grounded in the well-established literatures on authoritarianism and Machiavellianism, it also contributes a unique perspective on these important personality variables.

Integrative Cognitive Complexity

There is a long tradition of associating style of cognitive functioning with personality variables and with political ideology (Tetlock, 1983). Examples of such cognitive-style constructs include dogmatism (Rokeach, 1956, cited in Altemeyer, 1996), tolerance of ambiguity (Sidanius, 1978), flexibility-rigidity (e.g., Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950), and cognitive complexity (e.g., Tetlock, 1983, 1986). The question driving such research is whether or not people with certain personalities and/or people who are receptive to certain political ideologies also have characteristic ways of cognitively organizing their environments.

One approach to the question of cognitive style was devised by Schroder, Driver and Streufert (1967). They devised a coding system for measuring individual differences in a cognitive-style variable they termed *integrative cognitive complexity*. The emphasis in this interactionist approach is to focus on *how* a person thinks or processes new information in a given situation, rather than *what*. Although two people may express an attitude that is identical in content, the way they use that attitude in thinking, arguing, and making decisions may differ radically (Schroder et al., 1967). This emphasis on the structure of thought rather than its content makes the Schroder et al. method an excellent choice for evaluating the cognitive processes of individuals where political ideology is of interest, since there is no bias for or against any particular beliefs built into the system (Tetlock, 1983; cf Tetlock, 1986). Simple or complex arguments can be made in advancing any solution to environmental dilemmas.

Integrative cognitive complexity is comprised of two elements, the first of which is the cognitive *differentiation* of information (Schroder et al., 1967). Differentiation refers to the number of unique dimensions along which a person makes evaluative comparisons in reasoning about a given topic and to a person's ability to take into account different perspectives on that topic. For example, in ordering a meal in a restaurant, one person may use only two dimensions (taste and cost), whereas another person may add two other dimensions (nutritional value and hunger). The second person is demonstrating more cognitive differentiation in considering more dimensions in making a selection.

The second component of integrative complexity is known as *integration*, which refers to the extent to which a person develops complex connections among these

evaluative dimensions (Schroder et al., 1967). These connections are inferred when individuals refer to tradeoffs between alternatives, synthesize alternatives, or refer to higher-order concepts that subsume multiple perspectives (Suedfeld, Tetlock, & Streufert, 1992). A high degree of differentiation is therefore necessary but not sufficient to determine integrative complexity (Tetlock, 1986). Rather, the number and type of rules used for interrelating the dimensions of differentiation are most important. The person using four dimensions for ordering a meal may do so by compartmentalizing the dimensions, ordering them hierarchically, and failing to see their interrelationships (low integration), whereas the person using only two or three dimensions may use dimensions simultaneously, apply them in different and complex combinations, and use them to compare possible outcomes (high integration) (Schroder et al., 1967).

A number of studies have explored the relationship of integrative complexity to political ideology and to specific political beliefs and values. For instance, an archival study (Tetlock, 1983) analyzed the integrative complexity of congressional policy statements made by liberal, moderate, and conservative United States senators. The results showed that on average, conservative senators ($M = 1.79$) made significantly less complex policy statements than did moderate ($M = 2.51$) or liberal ($M = 2.38$) senators. The difference in the integrative complexity of liberal and moderate senators was not significant. In addition, integrative complexity remained stable across issue: Senators were consistent in putting forward more complex or less complex policy statements, regardless of the specific issues involved. In discussing his findings, Tetlock (1983) hypothesized that those senators who held multiple and conflicting values would be more likely to engage in

complex reasoning. Tetlock argued that because liberals and moderates are more likely to assign similar levels of importance to the values of freedom and equality, they should experience more of this value conflict and therefore demonstrate higher levels of integrative cognitive complexity. Conservatives, on the other hand, are more likely to value freedom over equality, and should experience less value conflict and therefore demonstrate lower levels of integrative cognitive complexity. According to Tetlock's interpretation, then, integrative complexity is associated with value-pluralism (1983).

In an elaboration of this value-pluralism hypothesis, Tetlock (1986) found that the more an issue triggered two conflicting and equally important values for students, the more integratively complex their reasoning about that issue. He presented participants with six questions pre-rated as high in their likelihood to engage value conflicts in individuals. For example, one question asked "Should more public park lands be open to mining and drilling exploration in order to promote economic growth and security?" (Conflicting values are "world of beauty" versus "comfortable and prosperous life.") Participants were asked to write down their thoughts in response to all six questions. Their integrative complexity scores on these responses were then compared to their responses on the Rokeach Value Survey (1973, cited in Tetlock, 1986). To the extent that people ranked both conflicting values highly in the Value Survey, they were likely to demonstrate higher integrative complexity when discussing the question that placed those two values in conflict. Thus, Tetlock argues that the value-pluralism model is supported: To the extent that conflicting values are part of a given issue, integrative complexity in reasoning about that issue should increase.

A study by Kristiansen and Matheson (1989), however, disputes Tetlock's conclusions. Their study asked students to write down their ideas about the desirability of allowing nuclear weapons in Canada. Students then completed Rokeach's Terminal Value Survey and a scale measuring their attitudes toward nuclear weapons in Canada. Finally, participants ranked each of the Terminal Values on how relevant they were to their attitudes toward allowing nuclear weapons in Canada. The authors found that the reasoning of people with more neutral attitudes toward nuclear weapons was more differentiated ($M = 2.59$) and integrated ($M = 1.56$) than the reasoning of antinuclear (differentiation: $t[261] = 4.67, p < .001$; integration: $t[261] = 4.16, p < .001$) or pronuclear participants (differentiation: $t[261] = 2.70, p < .01$; integration: $t[261] = 3.41, p < .001$). In other words, people with more moderate attitudes showed higher levels of integrative complexity. Unlike Tetlock (1986), who concluded that integrative complexity increases as a function of the ascribed importance of conflicting values (value-pluralism hypothesis), Kristiansen and Matheson (1989) concluded on the basis of further analyses that integrative complexity occurred because people who held conflicting values were attempting to justify them, regardless of the ascribed importance of the values (value-justification hypothesis). However, the authors issue a caveat that there may have been no conflict between the values "peace" and "national security" for pro-nuclear students: They may simply have considered these two values compatible with their pro-nuclear stance.

Similar reasoning may also account for findings by de Vries and Walker (1988) that people who were strongly for or against capital punishment demonstrated less integrative complexity when reasoning about this issue than those whose attitudes were

moderate. In this case, pro-capital-punishment people may have valued "human life" and "law" equally, but found both of these consistent with their positive attitude toward capital punishment, thus experiencing no value conflict. Thus, consistent with Schroder et al. (1967) and with Tetlock (1986), integratively complex reasoning appears to be associated with issues that engage two or more conflicting values, but only if those values are perceived as conflicting by the person who holds them.

The integrative-complexity construct has also been linked to another cognitive-style construct, flexibility-rigidity. For example, less complex conceptual structures are associated with greater rigidity and poorer adaptability in the face of various forms of stress (Schroder et al., 1967). The rigidity dimension has been considered a key element of authoritarianism in much theory and research (e.g., Adorno et al., 1950). The authoritarian person is seen as inflexible, rigidly incapable of change, and therefore clinging to outdated and overly-fixed rules of thought and conduct. However, there are a number of ways in which the Schroder et al. conception of integrative complexity differs from traditional notions of rigidity. First, integrative cognitive complexity is not viewed as a trait, but rather as part of a "different level of analysis--the information-processing level" (1967, p. 9). Second, integrative complexity is not viewed as independent of content area for any given individual. Different degrees of integrative complexity are seen as developmentally determined and based on experience in various content domains. Third, the level of integrative complexity within specific content areas is potentially malleable (Schroder et al., 1967). In the short term, the complexity of reasoning can be altered by the specific situation or topic, while in the long term, the complexity of reasoning can be altered by

experiences such as education/training or by an environment that fosters higher or lower levels of complexity in thinking (Suedfeld, Tetlock & Streufert, 1992).

It is this potential for malleability which makes integrative cognitive complexity an intriguing object of study as it pertains to environmental dilemmas. Although a great deal of effort and expense has gone into education about environmental issues, the results have often been unsatisfactory in terms of changing environment-related behaviour (e.g., Finger, 1994; Anderson, 1997). Yet it may be that these educational programs have focused too much on *content* at the expense of *structure*. That is, the focus thus far has been on environmental rules, habits, attitudes, etc. However, an alternative approach would be to develop information-processing structures, to give people the cognitive tools required for analysis and decision making in the realm of environmental issues (e.g., Kortland, 1996). In our society, progress in learning is often measured by how much information a person learns in a given time period. However, in topic areas as inherently complex as natural ecology, educational criteria that assess advances in the *structure* of thinking may be equally important.²

2

That is not to say that education alone can create the kind of psychological change needed to address ecological problems we are facing. In addition to the ability to engage in complex information-processing, people also need to be optimally motivated and interested, have enough knowledge and skills, and be able to work well in interpersonal contexts (Schroder et al., 1967). Of course, the psychological changes in turn comprise only one small aspect of the changes needed in sociological, political, and physical/technological realms.

Authoritarianism

Probably the most well-known psychological work on authoritarianism is that of Nevitt Sanford and his colleagues (Adorno et al., 1950). Their theory of the "pre-fascist" or authoritarian personality is essentially psychodynamic. It traces the characteristic beliefs of the authoritarian -- including anti-Semitism, ethnocentrism, pessimistic/cynical views of human nature, political and economic conservatism, and anti-democratic tendencies -- to unconscious psychological conflicts originating in childhood. This theory also holds that people who are highly authoritarian are likely to interpret the world in a way that is relatively rigid, simple and overly ideological.

Sanford and his colleagues' research culminated in the publication of *The Authoritarian Personality* (*TAP*; Adorno et al., 1950) and a questionnaire designed to measure the "pre-fascist" personality, called the F-scale. However, research on the authoritarian personality fell into disrepute after initially positive reviews of *TAP* gave way to methodological disputes over the validity and reliability of the F-scale (e.g., Shils, 1954). During the past decade, however, there has been a resurgence of research on authoritarianism (Stone, 1995). Responding both to these methodological critiques and to the psychodynamic theory underlying *TAP*, Bob Altemeyer (1981) created a new scale to measure authoritarianism. His scale, called the Right-Wing Authoritarianism [RWA] scale, differs from the original F-scale in a number of ways.

First, the RWA scale is counterbalanced, so that half of its items are worded in the "protrait" (authoritarian) direction and half are worded in the "contrait" (anti-authoritarian) direction (Altemeyer, 1981). This was done to address criticisms of the F-

scale that alleged that high scores on that scale merely reflected subjects' tendency to respond favourably to any questionnaire item (Cherry & Byrne, 1977). The counterbalancing of the RWA scale eliminates potential acquiescent response-set problems.

Second, the RWA scale is based on fewer traits than was the original F-scale. Following extensive and rigorous scale-construction methods, Altemeyer systematically tested and re-wrote items for the RWA scale until he was left with a core of items. These items, he found, tapped a more restricted set of attitudes than *TAP* authors had originally clustered under the term authoritarianism. Of their original nine traits, only three survived Altemeyer's testing: *authoritarian aggression*, *authoritarian submission*, and *conventionality*. Accordingly, Altemeyer defines authoritarianism as the covariation of these three "attitudinal clusters" (Altemeyer, 1981, 1988, 1996).

This new definition of authoritarianism, however, did not stem only from the results of Altemeyer's empirical testing procedure. Instead, Altemeyer's formulation reflects his preference for a more parsimonious, social-learning approach to personality (Altemeyer, 1996; Stone, Lederer, & Christie, 1993). This theoretical approach comprises the third major difference between the RWA scale and its predecessor. Many of the components of authoritarianism proposed in *TAP* were clearly psychoanalytically informed (e.g., "projection", "anti-intracception"), and F-scale items were often worded in such a manner as to test the personality structures assumed to underlie them only indirectly. In contrast, the RWA scale eliminates psychoanalytic constructs and assesses attitudes in a relatively straightforward manner (see Appendix E).

Finally, Altemeyer's reformulation of authoritarianism into *right-wing* authoritarianism addresses another problem encountered by *TAP* authors. As the threat of fascism subsided with war's end and that of Communism loomed, critics of *TAP* faulted its authors for ignoring the "authoritarian on the left" (e.g., Shils, 1954). These critics contended that *TAP* authors had failed to address, theoretically and empirically, the supposed high authoritarianism of communists and other radical left-wingers. By narrowing his empirical net to capture only those authoritarians on the right, Altemeyer assuaged most critics (although some continued to call for investigations of left-wing authoritarianism, e.g., Eysenck, 1982).

Altemeyer's theoretical approach to authoritarianism, his comprehensive, systematic research of the past 30 years, and his RWA scale have all been widely praised (e.g., Christie, 1991; Stone et al., 1993; cf. Meehan, 1994). Christie, for example, calls the RWA scale "the best current measure of the essence of what the authors of *TAP* were attempting to measure" (1991, p. 552).

Authoritarianism and environmentalism: Cognition or politics? According to Altemeyer (1988) and Doty, Peterson, and Winter (1991), authoritarian ideology is activated in part by the presence of perceived or actual threat. Issues that pose a public threat, such as environmental degradation, should therefore be linked to authoritarianism. Moreover, insofar as environmentalism conflicts with conventional ideology and submission to authority, we should expect a negative association between it and authoritarianism.

Indeed, there has been considerable support in the empirical literature for the

notion that authoritarians are less likely than non-authoritarians to support environmentalism. Peterson, Doty and Winter (1993) found that high RWAs scored higher on items denigrating the environmental movement (e.g., $r = .32, p < .001$) and were more likely to feel that when environmentalists disrupted business, they should be punished ($r = .56, p < .001$). However, they did not differ from low RWAs on items that involved punishing polluters. In this case, perhaps high RWAs' dislike for the environmental movement was offset by their general punitiveness (Altemeyer, 1996). Therefore, it may be important in measuring environmental attitudes for correlation with RWA scores that an environmentalism scale unconfounded with punitiveness be used.

A study of 184 Germans used principle components analysis to examine responses to 162 political issues and found four factors, which were interpreted as: "(1) general conservatism, preference for authoritarian punitiveness, (2) social welfare and support of women's equality, (3) liberalism and affirmation of technological progress, and (4) affirmation of increase in taxation for environmental protection and the development of East Europe" (Reimann, Grubich, Hempel, Mergl & Richter, 1993). High scores on the conservatism/authoritarianism factor showed low to moderate negative correlations with particular items in the fourth factor that were interpreted as favouring environmental protection (e.g., with "environmental tax", $r = -.25$; with "traffic prohibition in downtown areas", $r = -.20$) and moderate positive correlations with items interpreted as anti-environmental (e.g., with "enlargement of motor way network", $r = .32$; 1993, p. 316). This study provides indirect evidence for a negative association between authoritarianism and certain facets of environmentalism.

Altemeyer (1996) has done a number of studies that explore more directly the relation between environmental concern and RWA. For example, he had groups of students play the Global Change Game, a sophisticated simulation in which players take charge of the earth's future. In this game, a large world map is spread on a gymnasium floor, and players are randomly assigned to one of ten world regions. In a game run with only high RWAs, Altemeyer found that players directed most of their energies toward economics and paid little attention to the environment. When one region was warned that its plans to increase its forest industry could make its ecosystem vulnerable, a player replied " 'Let's do it anyway. Lumber is very profitable.'" (Altemeyer, 1996, p. 135) The high-RWA game ended with a nuclear war and annihilation of the human species. In contrast, in a game run with only low RWAs, there was an overly large population of 8.7 billion by game's end, but there was also far less poverty and a cooperative, demilitarized, and sustainable world had been achieved (Altemeyer, 1996). Of course, these games are only simulations, and participants know that no real harm can come to anyone as a result of their decisions. Nevertheless, the findings from these studies do form part of an emerging picture of authoritarians as essentially hostile to environmentalism.

Two recent studies by Schultz and Stone (1994) also showed that more authoritarian individuals tend to score lower on environmental concern. In the first study, which tested a sample of 80 activists working for or against the construction of a new coal-fired power plant, scores on an 8-item version of the RWA scale correlated $-.51$ ($p < .001$) with the ad hoc "River Environmental Scale". Unfortunately, this biased sample included serious confounds, with both gender and job status potentially influencing scale

scores. This is because most of the anti-power-plant activists were white-collar women, and most of the pro-power-plant activists were blue-collar men. Job status is a problem because, in general, RWA scores are negatively associated with job status (Altemeyer, 1981, 1996), and because some studies have found that job status and education are positively related to environmentalism (e.g., Scott & Willits, 1994). Gender is a problem because the literature shows that, on average, women tend to be more pro-environmental than men (e.g., Schahn & Holzer, 1990; Davidson & Freudenberg, 1996; Mainieri et al., 1997; cf MacDonald & Hara, 1994). Thus, we should expect that simply based on demographic variables, the anti-power plant activists would score higher on the NEP and lower on the RWA, while those in favour of the plant should have higher RWA scores and lower NEP scores on average.

However, a second study by Schultz and Stone (1994), which replicated the findings of the first, was not plagued by this type of sampling problem. In this study, which measured a sample of 87 undergraduates, scores on the full version of the RWA scale correlated $-.54$ ($p < .001$) with scores on the New Environmental Paradigm scale (NEP; Dunlap & Van Liere, 1978). Taken together, it seems that these two studies provide good support for the notion that authoritarianism and environmental concern are negatively associated.

The negative correlations between environmentalism and authoritarianism may be interpreted in several ways. First, although conventional authorities give lip-service to the notion of protecting our natural environment, their actions are often in direct conflict with the policies favoured by environmentalists. Thus, people scoring high on the RWA scale

may be demonstrating high authoritarian submission not to what authorities *say* about the environment, but to what they *do* (Schultz & Stone, 1994). Therefore, it seems likely that right-wing authoritarianism would correlate negatively with environmentalism as long as authorities' behaviours are perceived as anti-environmental.

The often-noted positive correlation between authoritarianism and conservatism (e.g., Altemeyer, 1996; McHoskey, 1996) offers a related perspective on the negative correlation between environmental concern and RWA scores. In North America, convention dictates adherence to an ethos of constant economic growth and expansion, which is often in conflict with the ideal of environmental protection. Since one of the three components of Altemeyer's RWA scale is conventionality, it is not surprising that authoritarianism (as measured by the RWA scale) and environmentalism should be negatively correlated, as long as convention upholds anti-environmental attitudes. However, if conventionality or conservatism account for all the variance in environmental-concern scores among high and low authoritarians, perhaps authoritarianism is an unnecessary construct in explaining the relation.

Another factor that may tie authoritarianism and negative environmental attitudes is cognitive style. An intriguing series of studies by Stone and his colleagues (Schultz & Stone, 1994; Schultz, Stone & Christie, 1997) provides evidence for this third possible explanation for the link between environmentalism and authoritarianism. Using the *Einstellung* experimental paradigm, they found that high RWAs were more cognitively rigid than low RWAs. The *Einstellung* ("set") paradigm presents participants with a series of problems (e.g., arithmetic or mechanical problems) solvable only by using a long series

of fixed steps, called a "set". After this "set" is established by a participant, s/he is presented with one or more new problems that can (or must) be solved by using a more direct, shorter solution. The extent to which participants persist in using the long-set solution, when using the short one would be either quicker or even necessary to solve the new problem, defines their *Einstellung* rigidity. In the Stone et al. (1994) studies, high-RWAs had a tendency to repeatedly apply the same solution to a mental problem, even when the objective conditions of the experiment demanded a change in approach. Altemeyer (1996) reports having replicated the Stone and Schultz findings twice.

Altemeyer (1996) has also investigated the cognitive functioning of authoritarians using several different approaches. He concludes that, compared to people scoring low on his RWA scale, high RWAs

have not spent much time examining evidence, thinking critically, reaching independent conclusions, and seeing whether their conclusions mesh with other things they believe. Instead, they have largely accepted what they were told by the authorities . . . leav[ing] them underpracticed in thinking for themselves. (1996, p. 93)

Among the findings that relate most directly to the concerns of the present study are those regarding compartmentalized thinking. Altemeyer (1988) presented 47 Christian high RWAs with two statements from the Bible: "Do not judge, that you may not be judged. For with what judgement you judge, you shall be judged" and "Let he who is without sin among you be the first to cast a stone at her". Twenty of the high RWAs stated that every word in the Bible should be taken literally, including these statements, while the other 27

high RWAs said we *should* judge others and punish them. (This second group offered no justification for going against the teachings of the Bible.) However, on their responses to scales measuring ethnocentrism and attitudes toward homosexuality, both groups of high RWAs spoke out in favour of both judgement and punishment, even those who had originally agreed with the Bible's admonition not to judge and/or punish others. Therefore, it seems that those high-RWAs who claimed they took the Bible's teachings literally simultaneously held contradictory ideas. Altemeyer (1996) asserts that they do this by compartmentalizing their ideas and by failing to examine their contradictory beliefs.

A number of other studies also provide evidence for a link between cognitive style and authoritarianism. In a series of studies, Hunsberger and his colleagues have shown small but significant negative correlations (-.18 to -.30) between RWA scores and integrative cognitive complexity as measured by the Schroder et al. (1967) coding system (e.g., Hunsberger, Pratt, & Pancer, 1994). Billings, Guastello and Rieke (1993) used the 16PF questionnaire (Cattell, Eber, & Tatsuoka, 1970, cited in Billings et al.) to test three models of authoritarianism. They found that high RWAs were low in imagination ($r = -.36, p < .001$) and high in closed-mindedness ($r = -.22, p < .05$). Therefore, it seems there is good evidence for the existence of low to moderate correlations between cognitive-style variables such as rigidity and complexity and scores on the RWA scale.

Explanations for these types of cognitive processes are theoretically and empirically related to authoritarianism (e.g., Adorno et al., 1950; Lesser & Hlavacek, 1977; Kline & Cooper, 1985), and there has been a long tradition of research seeking to link cognitive style with authoritarian personality (see Stone et al., 1993). One recent

study found a high negative correlation ($r = -.57, p < .001$) between Costa and McCrae's Openness to Experience factor (1985, cited in Riemann et al., 1993) and a trait its authors call "general conservatism, preference for authoritarian punitiveness" (p. 316). The correlation dropped only to $r = -.49$ ($p < .001$) when the authors controlled for seven demographic and personality variables (see Riemann et al., 1993, Table 2). According to Costa and McCrae, openness to experience "assesses the proactive seeking and appreciation of experience for its own sake [and] toleration for and exploration of the unfamiliar" (1985, quoted in Riemann et al., p. 319). The Riemann et al. findings mesh well with those of Adorno et al., who found that "there seems to be a general tendency on the part of low scorers [on the F scale] to expose themselves to broad experience--emotional, cognitive, perceptual--even at the risk of having to modify one's preconceived notions . . . " (1950, p. 464). Thus, it seems that there may be a dispositional tendency for some authoritarians to be more closed toward the world around them. As a means of protecting themselves against unfamiliar information and/or experiences, authoritarians may adopt a general stance of cognitive rigidity.

Other authors suggest that cognitive rigidity may reflect individual differences in information processing as it relates to problem-solving (Schultz et al., 1997). People who use a rigid problem-solving approach may do so because they have difficulty tolerating uncertainty, and therefore rely on ideology or simple rules to resolve problems. Since authoritarians tend to show a lower tolerance of uncertainty than non-authoritarians (e.g., Feather, 1971; cf, Durrheim & Foster, 1997), they may be resorting to a problem-solving approach which relies on such simple rules or ideologies for solving such cognitive puzzles

as the *Einstellung* problems.

A related explanation for authoritarians' cognitive rigidity in problem solving is proposed by Altemeyer (1988, cited in Schultz et al., 1997). He claims that, in high RWAs, a pervasive fear of chaotic and uncontrollable social conditions may interfere with systematic information-processing. This explanation has a major advantage over the generalized intolerance-of-uncertainty explanation, since it may explain why high RWAs tend to show greater *Einstellung* rigidity only under "ego-involving" conditions. In the study by Schultz and Stone (1994) the ego-involving manipulation involved deceiving research participants by claiming that their professors would be told the results of their problem-solving efforts. Two planned comparisons showed that authoritarians had higher rigidity scores than non-authoritarians under these ego-involving conditions $F(1, 78) = 4.23, p < .05$, but not under neutral conditions $F(1, 78) = .51, p > .05$ (Schultz & Stone, 1994). In contrast, older studies designed to measure the relation of *Einstellung* rigidity to authoritarianism manipulated ego-involvement by having the experimenter behave in an authoritarian (versus casual) manner (reviewed in Stone et al., 1993). Under either of these ego-involvement manipulations, authoritarians tend to demonstrate more cognitive rigidity than their non-authoritarian counterparts.

These two explanations for the *Einstellung* findings on authoritarians are not necessarily incompatible. One states that cognitive rigidity and authoritarianism are related because a low tolerance of cognitive uncertainty interrupts optimum problem-solving, while the other states that fear creates the interruption. Perhaps fear is the emotion underlying intolerance of uncertainty. For the purposes of the present investigation, the

important point is that either explanation for authoritarians' cognitive rigidity opens interesting possibilities for understanding the negative correlation between authoritarianism and environmentalism. It is sometimes proposed that authoritarians' relatively negative environmental views may represent a spurious association, better explained by the well-known negative correlation between environmentalism and conservatism (e.g., Scott & Willits, 1994). However, it seems likely that under highly involving conditions such as the consideration of important social issues, fear and/or intolerance of uncertainty may also be key factors in leading authoritarians to resort to tried-and-true methods for solving problems rather than attempt more systematic or complex strategies.

While it may be true that fear or intolerance of uncertainty leads authoritarians to adopt rigid problem-solving styles, the *Einstellung* paradigm seems to be an imperfect test of this hypothesis. The *Einstellung* paradigm is premised on the notion that people who are rigid in solving cognitive problems will also be rigid in solving social problems (Rokeach, 1948, cited in Stone et al., 1993). However, the ego-involvement manipulation used in the *Einstellung* studies does not actually alter the problem-solving task that participants in the treatment and control conditions face. In other words, all participants attempt to solve the same problems, but the social/emotional environment under which they attempt to solve them varies according to the ego-involvement condition. Note that this does not create the logical analog between solving cognitive problems and solving social problems that Rokeach proposed in his discussion of authoritarian cognition. Participants in the *Einstellung* studies demonstrate rigidity in solving cognitive problems,

but their rigidity in solving *social* problems is assumed on the basis of their high scores on authoritarianism. In contrast to this approach, the present study asks participants to solve hypothetical social problems, and measures the level of cognitive rigidity they demonstrate in doing so.

Taken together, the research on authoritarianism and cognitive style draws a fairly clear picture of the authoritarian as someone who is more cognitively rigid than the non-authoritarian. However, there has been little research to date examining the relation between authoritarianism and cognitive style in solving social problems. Most of the research has tended to measure cognitive style by stripping away the political context from the experimental situation. In contrast, the present study examines the cognitive style of authoritarians and non-authoritarians as it relates to the specific issue of environmental concern.

Machiavellianism

Another personality trait often associated with authoritarianism is Machiavellianism. The concept of the Machiavellian personality was derived from the writings of Niccolo Machiavelli, a 16-century Italian author. In *The Discourses* and *The Prince*, Machiavelli presented his view of the average person as self-serving, deceitful, and malevolent, and advised political and religious leaders to rule accordingly. In the 1960s, Richard Christie proposed that Machiavellianism could be understood as an individual difference variable, and created a scale for measuring it. After years of research and painstaking scale construction and validation, Christie and Geis (1970) published the definitive book on Machiavellian personality. In it, Machiavellians are characterized as

opportunistic, deceitful, suspicious, lacking affect in interpersonal relationships, lacking concern with conventional morality, having low ideological commitment, and yet lacking gross psychopathology (for a thorough review of more recent literature, see Fehr, Samsom, & Paulhus, 1992).

Despite intuited positive correlations between authoritarianism and Machiavellianism, few have been found to date (Christie & Geis, 1970; Christie, 1991; Altemeyer, 1997). Some low to moderate correlations have been found between Machiavellianism (as measured by the Mach-IV) and measures of authoritarianism, but seldom when using the RWA scale or any of the Adorno et al. (1950) scales. In fact, where the two have been correlated at all, they usually are slightly negatively related (e.g., $r = -.20$, cited in Fehr et al.; $r = -.18$, cited in Altemeyer, 1997). One potential explanation for this is that authoritarianism scales tend to tap only the submissive aspect of the authoritarian personality, and that Machiavellianism may be more related to the dominant facet of authoritarianism (Altemeyer, 1997). However, the present study examines the relation between these two traits from a cognitive and emotional perspective. From this perspective, it is the relative absence or control of emotion in Machiavellians versus authoritarians, and the extent to which this influences their cognitive performance in solving environmental problems, that is of interest. Therefore, the lack of strong correlations between these variables is not a concern for the present study.

Despite their low overall correlations, one level on which high Machiavellians and high RWAs might be expected to be similar is cognitive style. However, very little research has been conducted testing the cognitive style of Machiavellians. Primavera and

Higgins (1973) found no significant correlation between scores on the Mach IV and a non-verbal test of rigidity (Breskin, 1968, cited in Primavera & Higgins). Delia and O'Keefe (1976, cited in Fehr et al., 1992) tested the interpersonal cognitive complexity of Machiavellians (using the Role Category Questionnaire [RCQ]; Crockett, 1965), assuming that low Machs would score higher because of their greater involvement with others. In this study, scores on the Mach IV showed low to moderate correlations with the number of categories used to describe peers. An attempt at replication (Sypher, Nightingale, Vielhaber & Sypher, 1981, cited in Fehr et al., 1992), however, found no significant correlations between Mach IV scores and RCQ scores. No known study has examined the cognitive complexity of Machiavellians using the Schroder et al., (1967) integrative complexity scoring system, nor has any study measured their cognitive style with regard to the issue of environmental concern.

Machiavellianism and the environment: Simply self-interest? Among current social problems, environmental preservation is one that seems particularly well-suited to a study involving Machiavellians. Machiavellians, by definition more motivated by self-interest than others, should respond favourably to environmental concerns only when they are personally well-served by doing so. There is some experimental support for a link between Machiavellianism and environmentalism. Smith and Bell (1992) found that Machiavellianism was positively associated with achieving high scores in simulated commons-dilemma games. Typically, commons dilemma games are analogs of environmental situations in which short-term gain is pitted against long-term resource preservation. In Smith and Bell's experiment, behaviours leading to greater short-term gain

were rewarded with higher scores. Under these conditions, Machiavellians were more likely to engage in behaviour leading to greater short-term gain and thus achieved higher scores than non-Machiavellians.

If commons dilemma games are good analogs of more realistic environmental problems, we should expect Machiavellians to favour environmental solutions in which short-term personal gain is the primary aim. Like the environmental solutions hypothesized to be more typical of authoritarians, these may be less cognitively complex than environmental solutions that favour long-term environmental preservation balanced with short-term economic realities. The Machiavellian may use self-interest as the ideology or guiding principle for all decision-making, thus leading to environmental solutions that are necessarily less integratively complex than those which take into account and try to address multiple perspectives and interests.

For both authoritarians and Machiavellians, then, it seems that solutions to environmental problems are likely to be less complex than solutions generated by people scoring low on these two traits. For Machiavellians, simpler solutions may be proposed because they are likely to offer the most short-term gain: A Machiavellian is unlikely to be concerned with the very long-term effects of environmental destruction because they will not directly affect him or her. For authoritarians, simpler solutions may be proposed because they are quick, ideologically-based ways to reduce fear and/or uncertainty. The present study therefore measures participants' levels of Machiavellianism and authoritarianism as predictors of the integrative cognitive complexity of their solutions to hypothetical environmental dilemmas.

The Role of Emotion and Involvement in Predicting Integrative Complexity in Machiavellians and Authoritarians

As discussed above, authoritarianism is thought to be caused at least in part by fear. In contrast, the literature shows that high Machiavellians are relatively impervious to emotional distractions (Christie & Geis, 1970). In experimental games, for example, Machiavellians are able to focus on and successfully implement strategies that allow them to win more points, money, or credits, whereas their non-Machiavellian opponents become distracted by emotional considerations such as their game partners' emotions, needs, and intentions. Christie and Geis (1970) describe the Machiavellian as someone who is coolly detached from others and who is less emotionally involved with people, issues, or even with preventing their own embarrassment than non-Machiavellians.

In order to examine further this possible distinction between Machiavellians and authoritarians, the present study will experimentally manipulate participants' levels of emotional involvement. This will be done by employing two different target scenarios to which participants will respond (see Appendix F). Half of the participants will be presented with scenarios describing an environmental dilemma in impersonal terms and the other half will be presented with a similar scenario describing the same environmental dilemma in personal terms. This manipulation is designed to elicit ego-involvement in participants.³ This type of ego-involvement is intended as a means of also eliciting greater

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The most common ego-involvement manipulations tend to involve creating a competitive orientation in participants, either by telling them they are competing against peers in performing an experimental task, or by telling them that their task performance will be evaluated and/or has evaluative potential (e.g., Donley & Allen, 1977; Jagacinski &

emotional involvement in participants. A brief rating scale will serve as a manipulation check to ensure that desired effect is achieved (see Appendix F).

Based on the literature pertaining to emotional involvement and ego-involvement in authoritarians and Machiavellians, several hypotheses can be generated: First, high Machiavellians should be *less* influenced by the ego-involvement manipulation than low Machiavellians, leading to higher integrative complexity scores for the high Machiavellians. Second, high authoritarians should be *more* influenced by the ego-involvement manipulation than low authoritarians, leading to lower integrative complexity scores for the high authoritarians. Third, because of their greater emotional detachment, high Machiavellians should be less influenced by the ego-involvement manipulation than high authoritarians--the *difference* between the high-involvement and low-involvement scenarios should be smaller for high Machs than for high RWAs. The measure of the ego-involvement manipulation's influence on participants is the level of integrative cognitive complexity (Schroder et al., 1967) in the solutions they propose to the environmental dilemmas.

In addition to these three main hypotheses, three other hypotheses can be generated from the more general literatures on authoritarianism, Machiavellianism, and environmentalism. First, Machiavellianism and authoritarianism should have a low to moderate negative correlation. Second, Machiavellianism and environmentalism should have a negative correlation. Finally, authoritarianism and environmentalism should have a

Nicholls, 1984). In contrast, the purpose of the manipulation in the present study is to create increased task involvement based on self-referencing (see Butler, 1986; Nicholls, 1988).

moderate to high negative correlation.

Environmental Concern: A Possible Confound

A possible confound in the present study is the participants' level of knowledge about and support for environmental issues. Because the dependent measure is the degree of integrative cognitive complexity demonstrated by participants in proposing solutions to environmental dilemmas, it is reasonable to assume that participants with more extensive previous knowledge of environmental issues and/or more experience in reasoning about environmental issues are likely to generate more complex or varied solutions. Therefore, participants' levels of environmental concern will be measured using the New Environmental Paradigm scale (NEP; Dunlap & Van Liere, 1978).

The NEP is designed to measure a person's worldview or philosophy with respect to the earth and its natural resources. In Canada and the United States, there is a worldview dominated by "our belief in abundance and progress, our devotion to growth and prosperity, our faith in science and technology, and our commitment to a laissez-faire economy, limited governmental planning and private property rights" (Dunlap & Van Liere, 1978, p. 10). This has been called an "anthropocentric" worldview (e.g., Scott & Willits, 1994). Whereas an anthropocentric worldview is more common in our society, Dunlap and Van Liere (1978) assert that a new worldview, which they call the New Environmental Paradigm, is challenging these ideas. The bases of the NEP are beliefs that we need to balance economic growth with environmental protection, that we need to preserve a balance in nature without over-using non-renewable resources, and that we need to live in harmony with nature, rather than dominate and control it (Dunlap & Van

Liere, 1978).

The NEP has been used as a standard measure of environmental concern. NEP scores have been used in a number of ways, including being correlated with environmental behaviours (e.g., Scott & Willits, 1994) and with other environmental beliefs and attitudes (e.g., Gooch, 1995). In the proposed study, however, participants' scores on the NEP will be used merely to control for participants' previous levels of environmental concern/knowledge so that differences in integrative cognitive complexity associated with authoritarianism and Machiavellianism might be examined without confounding.

Environmental dilemmas. Political interests and the mass media usually present environmental-protection issues as zero-sum problems which pit differing interests against one another. One example is the pitting of economic prosperity against sound environmental practices. It is important to acknowledge this tension between economic growth and environmental protection, because in our consumption-based economy, it is largely realistic. Nevertheless, the fact that tensions exist between these two desirable goals does not mean that solutions to such dilemmas can only be all-or-nothing. Instead, creativity, innovation, and knowledge are needed to generate workable solutions. Therefore, the degree of integrative cognitive complexity people use when reasoning about environmental problems is of great interest. In order to examine the integrative complexity used in such reasoning, the present study will present participants with hypothetical environmental dilemmas and ask them to write their proposed solutions.

Method

Sample

The sample used in this study was comprised of 139 Carleton University students. One case was discarded due to careless responding, leaving a total sample of 138 students (51 men and 83 women). Participants' age ranged from 18 to 57, with a mean age of 24.7 for men ($SD = 6.89$) and 26.5 for women ($SD = 7.95$). An independent sample *t* test revealed no significant difference between the mean ages of male and female participants.

Measures

RWA Scale. As mentioned earlier, right-wing authoritarianism is defined as the covariation of three specific components: authoritarian aggression, submission to authority, and conventionality (Altemeyer, 1981, 1988). The most recent version of the RWA scale (Altemeyer, 1996) was used in the present study because while the content of its items is more up-to-date than that of earlier versions (e.g., the inclusion of feminism and the exclusion of Communism), the scale still retains the strong reliability and validity of previous versions. In a review of 31 studies that used the RWA scale, Altemeyer (1996) found the scale's internal consistency to be adequate, with alpha coefficients ranging from .81 to .93.⁴ The scale's empirical validity has also been extensively tested.

Overwhelmingly, studies of student and non-student samples confirm that scores on the RWA scale predict conventional behaviour (e.g., adherence to traditional gender roles),

⁴ One exception to this pattern was noted. Edwards and Leger (1993, cited in Altemeyer, 1996) obtained an alpha coefficient of only .43 with a sample of Xhosa-speaking students taking the scale in English. The researchers gave no explanation for this anomaly.

authoritarian aggression (e.g., punishment of peers in a learning situation) and submission to authority (e.g., tolerance of governmental abuses of power; Altemeyer, 1996).

Correlations between RWA scores and these other measures range from .40 to .60, and many exceed .60.

The RWA scale consists of 34 items (see Appendix E). Fifteen of these are "protrait" items (items 5, 7, 9, 11, 12, 15, 17, 18, 21, 23, 26, 28, 30, 32, 34) indicating higher authoritarianism, and fifteen (the remainder) are "contrait" items, which are reverse scored. This counterbalancing reduces the chance that results could be an artifact of "yea-saying" or "nay-saying" response biases (Altemeyer, 1981). The scale uses a 9-point Likert-type response format ("very strongly disagree" is scored -4, "very strongly agree" is scored +4). Items one through four are not scored: they are "table-setters" and are designed to accustom respondents to the response format and to familiarize them with the scale's contents (Altemeyer, 1996, p. 15).

Mach-IV Scale. The standard measure of Machiavellianism is the Mach-IV scale (Christie & Geis, 1970). In his 1991 review of eight measures of interpersonal trust and attitudes toward human nature, Wrightsman rated Christie & Geis's Machiavellianism Scale number one in terms of its "general usefulness" and the amount of research it has generated. He calls it "a showcase example of successful attitude scale construction" (p. 374).

The Mach-IV scale is a measure of a person's general strategy for dealing with others. In developing the scale, Christie and Geis (1970) began by drawing 71 items from the writings of Machiavelli, with items covering three general areas: (1) interpersonal

tactics, (2) views on human nature, and (3) general or abstract morality. They then performed an item analysis, and the 10 best items worded in the Machiavellian direction and the 10 best items worded in the non-Machiavellian direction were chosen for the 20-item, counterbalanced scale (see Appendix E). Items 1, 2, 3, 4, 7, 8, 12, 15, 19, and 20 are reverse-scored. This counterbalancing minimizes the likelihood that indiscriminate agreement or disagreement could skew responses to the items.

Items are scored on a standard Likert-type scale ("agree strongly" is scored 7, "disagree strongly" is scored 1). A constant of 20 is added to each respondent's score, so that the midpoint (neutral point) of the scale becomes 100, with a minimum of 40 and a maximum of 160. Higher scores on the scale indicate higher Machiavellian tendencies.

The Mach IV has shown good internal consistency (e.g., $\alpha = .79$; Gable & Dangello, 1994) and test-retest reliability ($r = .73$; Zook & Sipps, 1986). The Mach-IV's construct validity has been assessed by several researchers. For example, Machiavellianism was positively correlated with nonpathological paranoia (Christoffersen and Stamp, 1995), and with hostility and aggression (Wrightsman & Cook, 1965 and Guterman, 1970, both cited in Fehr et al., 1992). Mach-IV scores have also been correlated with cheating (e.g., Cooper & Peterson, 1980, cited in Fehr et al., 1992) and lying believably (e.g., Geis & Moon, 1981, cited in Fehr et al., 1992). Thus, it seems that scores on Machiavellianism have good empirical or construct validity. As the reliability of the gender-neutral version developed by Zook and Sipps (1986) does not differ significantly from that of the original scale, their scale was used in the present study.

Marlowe-Crowne Social Desirability Scale. The Marlowe-Crowne Social

Desirability scale is a measure of research participants' tendency to respond to self-report questionnaires in a socially desirable way. The scale has been widely used in psychological testing, and has been shown to have adequate reliability (e.g., $\alpha = .78$, Crowne & Marlowe, 1960; $\alpha = .72$, Fehr et al., 1992). The scale consists of 33 true-or-false items (Appendix E). Higher scores on the Marlowe-Crowne scale indicate a higher degree of socially desirable responding.

Because high scores on the Mach-IV require socially undesirable responses, there has been concern since its development that the scale might be confounded with social desirability (Christie & Geis, 1970). Zook and Sipps (1986) found that scores on the Mach IV were not significantly correlated with scores on a social-desirability scale. However, a number of other studies have found significant negative correlations between Mach-IV scores and scores on the Marlowe-Crowne Social Desirability scale (e.g., $r = -.17$, Christie, 1970; $r = -.10$, Biberman, 1985, both cited in Fehr et al., 1992). Therefore the Marlowe-Crowne was administered to all participants in the present study and social desirability was controlled for in all analyses involving Machiavellianism.

NEP Scale. The New Environmental Paradigm [NEP] scale was devised by Dunlap and Van Liere (1978) as a standard measure of environmental concern (see Appendix E). The scale has adequate reliability ($\alpha = .81$) and face validity as a measure of environmental concern (Dunlap & Van Liere, 1978). The scale items are designed to tap the progrowth versus environmental protection dimensions detailed in Milbrath (1984). Specifically, Dunlap and Van Liere believe that the "anthropocentric worldview" typified by "our belief in abundance and progress, our devotion to growth and prosperity, our faith in science and

technology, and our commitment to a laissez-faire economy, limited governmental planning and private property rights" (1978, p. 10) is being challenged by a "new environmental paradigm" (NEP). This NEP includes a belief in limiting growth, the need to balance economic growth and environmental protection, the need to preserve the balance of nature, and the importance of humans living in harmony with nature. The scale is counterbalanced, with items 3, 4, 6 and 10 being reverse-scored. Following Schultz and Stone (1994), the present study used a 7-point Likert-type scale, with higher scores indicating a higher degree of environmental concern.

Environmental dilemmas. In a recent exploratory study on values and ethical principles used in judging environmental dilemmas, Seligman, Syme and Gilchrist (1994) found three main clusters after performing a factor analysis of environmental-dilemma scales: (1) environmental danger/loss, (2) jobs, and (3) freedom. Therefore, the scenarios developed for the present study (see Appendix F) included elements of these three factors as a way to improve the empirical validity of the dilemmas.

In addition to the inclusion of these three key factors, the creation of the environmental dilemmas also took into account the desirability of increasing the variability in participants' integrative-complexity scores; scores for student samples typically fall into a narrow range of quite low scores (Schroder et al., 1967). According to Schroder et al., the most successful prompts in generating text for integrative-complexity analysis use " . . . stimulus situations implying conflict, uncertainty, and control in a given domain" and such prompts "produce more construct relevant responses" (p. 186). Such stimuli, along with scenarios that imply the existence of "interpersonal conflict" and "external standards"

also produce the best inter-rater reliability and construct validity (Schroder et al., 1967, p. 190). In other words, scenarios which engage the participant in a process of "resolution" are the most effective in electing materials to be scored for integrative complexity (1967, p. 190). In addition, requiring participants to write essays instead of the more usual sentence- or paragraph-completion tests (S/PCTs) is preferable because essays "provide an optimal opportunity for a person to utilize high-level conceptual rules." (Schroder et al., 1967, p. 200). Therefore, the environmental dilemmas created for use in this study are ideally suited for analyzing the degree of integrative complexity in participants' environmental opinions.

Moreover, in order to manipulate the level of ego/emotional involvement participants experienced while they were responding to the dilemmas, two dilemmas were created. In the low-involvement condition, participants were asked to imagine that in "a medium-sized Scandinavian town", "proponents" and "opponents" of a proposed new chemical factory must decide whether to allow the new plant to be built. In this version of the dilemma, proponents cite the advantage of job creation, while opponents cite the company's poor environmental record. In the high-involvement condition, participants were asked to imagine the same environmental dilemma, but the dilemma was situated "in your home town". In both the high- and low-involvement conditions, participants were asked to state how the town should resolve this dilemma and whether they believed the factory should be built.

A brief rating scale was administered to test the effectiveness of this manipulation. Based on authoritarianism research featuring ego-involvement manipulations (see Stone et

al., 1993 for a review), two aspects of involvement were tapped. Two questions asked participants to rate their level of emotional involvement ("While reading about the environmental dilemma and writing down my proposed solutions, I felt *emotionally* involved.") and personal involvement ("While reading about the environmental dilemma and writing down my proposed solutions, I felt *personally* involved.") on a scale ranging from -4 to +4. In order to obtain a composite measure of perceived involvement for each participant, scores on these two items were summed. The resulting involvement scores thus range from -8 to +8.

Procedure

Participants for the main study were recruited from three classes of undergraduate psychology students (49.100, 49.210, and 49.270). Students in 49.100 were recruited through posters affixed to the psychology bulletin board (Appendix B) and through classroom announcements. As incentive for participation, these students were given either one grade-raising experimental credit ($n = 6$) or ten dollars ($n = 37$) for participating in the study. The remaining students ($n = 95$) participated as part of a regular psychology lecture and were not remunerated. Analysis of variance revealed no significant differences on any of the study's key variables related to method of recruitment or remuneration.

At the beginning of each testing session, students were asked to give their informed consent to participate (Appendix C). All students were told that their participation was voluntary and that they could leave at any time without incurring any penalty. Next, students received a package containing the questionnaires and dilemmas. The order of questionnaire presentation was counterbalanced such that half of the

participants completed the NEP first and half completed the environmental dilemmas first, and participants were instructed to complete the tests in the order in which they were presented in the questionnaire package (see Appendix D). Analysis of variance revealed no statistically significant ordering effects.

During the testing sessions, students completed the New Environmental Paradigm scale (Dunlap & van Liere, 1978), a gender-neutral version of the Mach-IV scale (Zook & Sipps, 1986), the most recent version of Altemeyer's RWA scale (Altemeyer, 1996), the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) and either the high-involvement or the low-involvement environmental dilemma. Participants were randomly assigned to the high-involvement or low-involvement condition. They were asked to write solutions to these hypothetical dilemmas, with a maximum time limit of 10 minutes. After they had completed the questionnaires and the environmental dilemma, participants were also asked to complete a brief demographic survey (Appendix G). After participants had completed the study, they were debriefed and thanked for their participation (Appendix H).

Integrative-complexity scoring. Participants' written responses to the environmental dilemmas were coded and scored for their level of integrative cognitive complexity according to the method described by Schroder et al. (1967) and by Baker-Brown et al. (1992). Scores for integrative complexity are assigned along a 7-point scale. Scores of 1, 3, 5 and 7 are defined and scores of 2, 4 and 6 provide for points of transition between scores (see Appendix I). Integrative complexity scoring entails scoring each participant's response for both differentiation and integration (each on a 5-point scale),

and then combining these two scores to obtain the participant's single score for integrative cognitive complexity (on a 7-point scale; see Appendix I).

Low scores for differentiation are assigned if participants do not demonstrate that they are aware of alternative ways of looking at the issue and/or if they rely on rigid, dichotomous rules to arrive at a decision about the issue. For example, the following solution received a differentiation score of 1:

The obvious solution to this dilemma is not to build the factory. The negative impact on the community is greater than mere employment. A fair way to decide would be to have a vote by the community members on the issue. This way everyone has the chance to voice their opinion. I think the factory should [not] be built until the long term effects have been studied carefully for a long period of time. A healthy environment is just more important than jobs.

Moderate scores for differentiation are assigned if participants demonstrate recognition of at least two points-of-view on the issue. For example, the following solution received a differentiation score of 3:

In any case where environmental concerns (health, air quality) are in opposition to community causes (new jobs, health care) we have to weigh things carefully. I personally would want to see some long term studies involving the chemicals involved; educating the public with a few true examples of the environmental effects, and then having a referendum. The chemicals in the waste most likely have each been studied individually; these studies must be made public, however, as long as the emissions are below the recommended health levels I see no problem

with holding a referendum, once the true nature of the danger has been presented to all. I would vote against it, as I distrust any chemicals which have not been properly monitored and tested, but then again it is up to the town and not just one person.

High scores for differentiation are assigned if participants recognize multiple ways of looking at the issue. For example, the following solution received a differentiation score of 5:

I think there should be a town meeting to generate ideas for alternatives. Look into inviting a manufacturing company of parts that would not involve chemical waste and pollution, or see if there may be possibilities to form other businesses or service markets without outside resources. If the majority of the townspeople wish the chemical factory to be located in their town, look into what safety precautions are already being taken, what upgrades might be possible for better environmental control, or alternative methods for waste reduction and disposal. Perhaps a chemical process that would be cleaner but slightly more expensive could be negotiated for exchange of the location and a contract including outside inspections to be performed routinely. That way even more jobs would be there because inspectors and other jobs would be created. They could put the factory outside the town, but then there would be pollution from trucks and maybe spills to think about.

Integration scores are assigned following a similar pattern. Low scores for integration are assigned if participants do not demonstrate that they are aware of

alternative ways of looking at the issue or if they recognize alternative perspectives but fail to see any linkage between them. For example, the following solution received an integration score of 1:

I don't think the chemical factory should be built because that will cause serious problems such as in the other town. I think the factory should consider those big problems. If they want to build a factory in my town I think they can build another one in the other town where they already have a factory. Also I think if people need a job they should move to the other town to find a job. I think they should consider the problems like health problems more than building the factory just for jobs.

Moderate scores for integration are assigned if participants explicitly attempt to create guidelines for dealing with any tradeoffs between positive and negative outcomes of a decision on the issue, and/or if they try to develop comparison rules that explain why "reasonable people" might hold different points-of-view on the issue. For example, the following solution received an integration score of 3:

Yes build the factory, but get special funding from the government to institute the special defences against pollution. A concrete basin around and beneath the perimeter of the factory would ensure no or very low seepage. As well gas filters on any exhausts would eliminate dangerous fumes. Special dump sites should be created to safely house waste. If the government wants to create jobs there will be no difficulty accessing public funds. Otherwise political issues will need to be addressed to convince the government of the benefits. More jobs create more taxes

and require less welfare payments, these facts might influence the government.

High scores for integration are assigned if participants develop complex rules for comparing, contrasting and synthesizing multiple perspectives on the issue (Baker-Brown et al., 1992).

For example, the following solution received an integration score of 5:

Building the factory would give me a much needed job; however, there are downfalls to this, primarily pollution. What type of health problems and how will they later affect the aging population? Plus health care costs are very high, thus job gains may be cancelled out. Not building means no job. Jobs are scarce, 9-10% unemployment in my area. There are downfalls to being poor; it is known that poverty means less healthy people. Further study is possible, too. Could the town make a "greener" factory? Selling their products might be guaranteed marketability. It's basically an issue of balancing all these factors. An open forum discussion and vote is needed to make sure that in all this decision the town sticks to democratic principles and not let certain people decide, like doctors might get more customers with bad health effects, or restaurants might make more money if people have jobs to spend money. But the people who live closer to the factory should count more because they will be more affected by the pollution (maybe 1.5 votes?).

Overall scores on integrative complexity are obtained by combining differentiation and integration scores. It should be clear from the above description and examples that differentiation is necessary but not sufficient for integration to occur. In other words, it is

necessary for participants to first recognize alternative points-of-view or dimensions of an issue before they can begin to integrate them. Therefore, while low scores on integrative complexity are assigned to participants demonstrating both low differentiation and low integration and high scores are assigned to participants demonstrating both high differentiation and high integration, moderate scores in integrative complexity are assigned to participants demonstrating high differentiation if their scores on integration are low to moderate (see Appendix I).

As a reliability check on coding procedures, two coders (one of whom is kept blind to the experimental conditions and specific hypotheses) must reach 80% agreement on independently scored responses (Baker-Brown et al., 1992). In the present study, this level of reliability was accomplished in two steps. First, the principle investigator was self-trained using the scoring manual by Baker-Brown et al. (1992) until scoring on the provided practice protocols exceeded the required 80% agreement with expert scoring ($r = .84$). Second, an assistant was trained using the scoring manual and practice protocols before moving on to scoring participants' actual responses to the environmental dilemmas. The requisite 80% agreement between the two scorers was exceeded within the first 30 responses to the environmental dilemmas ($r = .82$). Once coding reliability had been established, the principle investigator scored the remaining responses alone.

Results

Before the main analyses were performed, the data were examined for univariate outliers, normality, gender effects, scale reliability, and ordering effects. First, an examination for univariate outliers revealed that scores on all cases but one were within the recommended range of +3 or -3 standard deviations (Tabachnick & Fidell, 1983). Following the method outlined in Tabachnick and Fidell, that one case was altered by decreasing the participant's score (on the NEP) by 1.5 standard deviations. Second, assumptions of normality and homogeneity were assessed for each variable. An examination of the skew and kurtosis standard scores for each variable led to the decision not to further transform any of the data (Tabachnick & Fidell, 1983). Third, the data were examined for possible gender differences. Analysis of variance revealed that there were no significant gender differences on any of the variables (Cognitive Complexity, NEP, RWA, Mach-IV, Social Desirability, Involvement). Next, the internal consistency of each of the published scales was determined by calculating Cronbach's alphas. All scales were found to have Cronbach alphas consistent with those found in previous research (Mach-IV, $\alpha = .72$, $n = 139$; NEP, $\alpha = .70$, $n = 139$; RWA, $\alpha = .81$, $n = 139$; Social Desirability, $\alpha = .72$, $n = 127$; refer to Methods section). Finally, the data were analyzed for possible effects associated with the order of questionnaire presentation. An independent samples t test revealed no significant difference on the means of any of the study's variables based on the order of questionnaire presentation.

After conducting the preliminary analyses, the data were analyzed to determine the effect of the involvement treatment condition. Following this, descriptive statistics were

computed, and then correlations among key variables were performed. Finally, analysis of covariance was conducted to determine the effect of RWA, Mach-IV, and NEP scores on integrative cognitive complexity.

In order to test the hypothesis that participants responding to the high-involvement dilemma actually experienced a higher level of perceived involvement than participants responding to the low-involvement dilemma, an independent-samples *t* test was conducted. This *t* test revealed no significant differences in perceived involvement for participants responding to the high- versus low-involvement scenarios. These results may indicate that the manipulation of involvement using the high- and low-involvement scenarios was unsuccessful. Alternatively, it may indicate that the ad-hoc scale used to measure perceived involvement did not capture participants' sense of involvement in the environmental dilemma exercise. This second explanation, however, seems unlikely, since analysis of variance also indicated that there were no significant differences in participants' mean scores on any of the study's key variables based on their assignment to the high-involvement or low-involvement dilemma. Regardless of the specific interpretation, the results indicated clearly that there remained no empirical rationale for maintaining the subdivision of participants according to the involvement treatment condition to which they had been assigned, and therefore no further analyses were conducted using the high-low involvement manipulation.

Next, descriptive statistics were calculated for each of the study's major variables. These statistics revealed that participants' overall scores on the RWA scale ($M = 172.69$, $SD = 23.44$) were higher on average than those ordinarily reported in the literature (scores

of 125 to 150 are usual for student samples; see Altemeyer, 1996). An independent samples *t* test showed that the mean RWA score of Canadian participants ($M = 169.98$, $SD = 21.83$) was significantly lower than that of non-Canadian participants ($M = 184.18$, $SD = 27.31$), $t(133) = -2.90$, $p < .01$. Because of this difference, and following the research strategy outlined by Altemeyer (1988, 1996), all non-Canadian participants ($n = 28$) were eliminated from further analyses involving the RWA scale, leaving a total sample of 107 Canadian students for all such analyses. In addition, the mean social desirability score was also significantly lower for Canadians ($M = 13.37$, $SD = 5.59$) than for non-Canadians ($M = 16.15$, $SD = 5.64$), $t(131) = -2.30$, $p < .05$. Given these results and the small number of non-Canadians in the sample, no further analyses were conducted on these individuals (but see Appendix J).

After having removed non-Canadian participants from the analysis, most of the major variables included in the present study revealed the sample's mean scores to be similar to means commonly reported in the relevant literature. Their means and standard deviations are listed in Table 1 (minimum and maximum possible scale scores are given in parentheses). A mean score of 66.31 ($SD = 9.28$) on the NEP is in line with those reported by Dunlap and van Liere ($M = 63.48$; 1978) in a general population sample and by Schultz and Stone (1994) using a student sample ($M = 68.52$). Scores on the Machiavellianism scale were also typical, with a mean score in the present study of 88.87 ($SD = 14.29$). These scores are similar to those reported in Fehr et al.'s review of the Machiavellianism literature, in Bakir et al. (1996) with a sample of male Turkish medical students ($M = 93.4$, $SD = 12.4$), and in Zook and Sipps (1986, $M = 90.14$ to 93.19) with

samples of US undergraduate students. Mean scores on the Marlowe-Crowne social desirability scale ($M = 13.37$, $SD = 5.59$) were also typical. Crowne and Marlowe themselves report a mean of 13.72 ($SD = 5.78$) for a sample of introductory psychology students (1960).

Some of the mean scores obtained with the present sample are, however, different from those typically reported in the relevant literatures. One such case is the mean score of students on the RWA scale. Even after removing the non-Canadian participants from the sample, the mean RWA score was 169.98 ($SD = 21.83$; see Table 1), still considerably higher than the typical mean of 125 reported by Altemeyer (1996) and in other literature (e.g., $M = 123.3$, Schultz & Stone, 1994 -- see Discussion section). Another exception is the present sample's mean score on integrative cognitive complexity, which is somewhat higher at 3.44 (on a 7-point scale) than the typically-reported mean of approximately 2.0 for student samples (see Suedfeld, Tetlock & Streufert, 1992). This difference may represent the success of the present study's deliberate strategy of increasing the variability in complexity scores (see Environmental Dilemmas section). Finally, scores on perceived involvement were obtained from an ad-hoc two-item scale serving as a manipulation check and thus cannot be compared to any other sample means.

Table 1. Descriptive Statistics for Rating Scales.

Scale	Mean Score	Standard Deviation	Sample Size
RWA (30 - 270)	169.98	21.83	107
Mach-IV (40 - 160)	88.87	14.29	107
NEP (12 - 84)	66.31	9.28	107
Social Desirability (0 - 33)	13.37	5.59	106
Integrative Cognitive Complexity (1 - 7)	3.44	1.58	107
Involvement (-4 - +4)	1.39	3.44	107

Once descriptive statistics had been computed, correlational analyses were conducted to explore the effect of the control variables (NEP, Social Desirability, Perceived Involvement) on the independent (RWA, Mach-IV) and dependent (Cognitive Complexity) variables. As predicted, scores on the NEP were significantly correlated with scores on cognitive complexity ($r = .20, p < .05$). Scores on social desirability were significantly correlated with scores on both RWA ($r = .33, p < .001$) and Machiavellianism ($r = -.29, p < .01$). All of these correlations confirmed the need to remove the effect of the control variables from further analyses. In addition, although scores on perceived involvement were not significantly correlated with scores on RWA, Mach-IV, or cognitive complexity, they were significantly correlated with scores on the NEP ($r = .23, p < .05$). Therefore, in order to remove any effect of perceived involvement, further analyses also

controlled for that variable.

In order that analysis of covariance might be conducted, participants were divided into groups based on a median split of their scores on the RWA and Mach-IV scales. Although it would have been preferable to create these groups using the highest- and lowest-scoring quartiles (e.g., see Altemeyer, 1988; Christie & Geis, 1970), in the case of the present study, such a division resulted in unacceptably small cell sizes. Therefore, it was preferable to conduct analyses using groups of high and low RWAs (median = 167) and high and low Machs (median = 89) based on a median-split division of scores. This strategy is sometimes employed in research on both right-wing authoritarianism (e.g., Schultz et al., 1997) and Machiavellianism (e.g., Ramanaiah et al., 1994). Analysis of variance revealed that high-RWA participants ($M = 185.4$) had significantly higher RWA scores than low-RWA participants ($M = 151.73$), $F(1, 106) = 154.64$, $p < .0001$. Analysis of variance also revealed that high-Machiavellian participants ($M = 99.74$) had significantly higher Mach-IV scores than low-Machiavellian participants ($M = 76.94$), $F(1, 137) = 273.05$, $p < .0001$.

Once this division of groups was complete, analysis of covariance was conducted to determine whether any differences on mean cognitive complexity scores could be attributed to scores on RWA or Mach-IV when controlling for the effects of perceived involvement, NEP, and social desirability. However, because scores on NEP were significantly correlated with scores on the dependent measure ($r = .20$, $p < .05$), employing NEP as a covariate would have violated one of the central assumptions of analysis of covariance (Tabachnick & Fidell, 1983). Therefore, following the method

outlined in Tabachnick and Fidell (1983), NEP was converted into another independent variable by assigning participants to high and low NEP groups based on a median-split division of NEP scores (median = 67). In such a procedure, any main effects or interactions of NEP are simply interpreted as would be main effects and interactions involving any independent variable. On the other hand, social desirability was acceptable as a covariate in the analysis because while it showed a significant correlation with both independent variables (RWA: $r = .33, p < .001$; Mach-IV: $r = -.29, p < .01$), it was uncorrelated with the dependent variable. The same is true of perceived involvement, which showed a significant correlation with the now-independent variable NEP ($r = .23, p < .05$) but not with the dependent variable. Therefore, the final ANCOVA was performed using Cognitive Complexity as the dependent variable, RWA, Mach-IV, and NEP as independent variables, and social desirability and perceived involvement as covariates. This analysis revealed a significant main effect of RWA on Cognitive Complexity, $F(1, 105) = 5.52, p < .05$. The main effects of Mach-IV and NEP were not significant, nor were any of the two-way interactions or the three-way interaction.

Discussion

Overview

Although the results of the present study do not provide support for some of its original hypotheses, they do often support the existing literature in several respects. First, and as predicted in the present study, they show that people scoring low on authoritarianism demonstrate a greater degree of cognitive complexity than people scoring high on authoritarianism. Second, the results provide no evidence for a correlation between Machiavellianism and authoritarianism. Third, there was some evidence that higher scores on NEP were associated with higher demonstrated levels of integrative cognitive complexity. Fourth, Canadians had lower RWA scores on average than non-Canadian participants. Finally, social desirability was negatively associated with high scores on Machiavellianism.

Although the present study's results support the literature in several ways, the results sometimes conflict with previous findings. First, there was no evidence for an association between NEP scores and scores on either Machiavellianism or authoritarianism. Second, there was no evidence that authoritarians' levels of cognitive complexity changed as a result of their assignment to high or low involvement conditions or as a result of their perceived levels of involvement.

Finally, some other findings have no corroboration in the extant literature simply because they have not been previously published. For example, there was a positive correlation between scores on the NEP and perceived involvement. In addition, there was a positive correlation between RWA scores and social desirability scores. Finally, analysis

of covariance revealed that, when statistically controlling for the effects of social desirability and perceived involvement, only the main effect of RWA scores on cognitive complexity was significant. The main effects of Machiavellianism and NEP scores were not significant, and none of the interaction effects involving these three variables were significant.

Authoritarianism and Integrative Cognitive Complexity

The most important finding in the present study was the association between authoritarianism and integrative cognitive complexity. Participants scoring higher on RWA were significantly more likely than those scoring lower on RWA to respond to the environmental dilemmas using a low degree of cognitive differentiation and integration. (This result held true even when social desirability and perceived involvement were statistically controlled using analysis of covariance.) This finding is in line with the findings of other researchers, who have shown that authoritarians demonstrate less complexity and more rigidity cognitively than their non-authoritarian counterparts (e.g., see Stone et al., 1993). The fact that the present study measured cognitive performance using the Schroder et al. (1967) conception of integrative cognitive complexity lends further support and legitimacy to the existing literature. Previous research has employed many different conceptions of cognitive complexity and cognitive rigidity, including *Einstellung* rigidity (see Stone et al., 1993), factors such as imagination and closed-mindedness (Billings et al., 1993), Costa and McCrae's openness-to-experience factor (see Riemann et al., 1993), intolerance of uncertainty (Feather, 1971) and intolerance of ambiguity (see Durrheim & Foster, 1997). All of these have shown high-authoritarian individuals to be less likely than

low-authoritarian individuals to show openness, flexibility, and complexity in their thinking. However, unlike the cognitive-style variables used in these studies, the Schroder et al. (1967) conception of cognitive complexity is not a trait-based approach to cognitive functioning. Rather, it allows that cognitive complexity may vary in different content domains and as a result of experience. Therefore, its use adds a unique perspective to the study of the relation between authoritarian personality and cognitive style.

Another major difference between the findings of the present study and those of the *Einstellung* researchers is that more authoritarian participants were less cognitively complex regardless of their level of perceived involvement in the problem-solving situation. In other words, the present study's findings suggest that participants' sense of (ego) involvement is an unimportant determinant of authoritarians' cognitive complexity. Of course, this may simply be a reflection of the ego-involvement manipulation used in the present study. However, the fact that high RWAs scored lower on cognitive complexity than low RWAs suggests otherwise. In nearly all of the *Einstellung* studies, authoritarians demonstrated more cognitive rigidity *only* under the high-involvement conditions. This suggests that something unique to the present study was associated with the finding that high RWAs achieved lower average cognitive complexity scores than low RWAs.

It may be that, as Schroder et al. (1967) suggest, cognitive complexity is domain specific -- authoritarians may demonstrate lower cognitive complexity for some tasks but not for others. This makes sense if we consider that, according to Altemeyer (1997) more authoritarian individuals tend to "travel in close circles of like-minded people" and are less likely than low-RWAs to seek out views that disconfirm their own opinions and those of

the conventional authorities in their lives (Altemeyer, 1996). Given the limited environmental discourse of these conventional authorities, it would not be unreasonable to assume that high-RWAs might have little exposure to complex models of environmental decision-making. These relatively conventional and submissive individuals are unlikely to be exposed to or to assimilate unconventional or even thoroughly articulated views on environmental problems.

Another possible reason for the lack of a relationship between involvement and cognitive complexity in authoritarians emerges if we examine more closely the specific manipulation of involvement used. The present study employed a standard manipulation of personal involvement, in which participants in the high-involvement condition were asked to imagine a situation in which they were likely to be more involved (the dilemma took place in their town and they and their family would be directly affected by the outcome of the decision). Participants in the low-involvement condition were asked to imagine a situation in which they were unlikely to be involved (the dilemma took place somewhere far away and they and their family would not be directly affected by the outcome of the decision). In contrast, the *Einstellung* studies which spurred the present interest in involvement conditions took a very different approach to manipulation involvement. In these studies, one of two general approaches was employed to stimulate "ego-involvement". In the first approach, the experimenter (or a confederate) would behave in either an authoritarian or non-authoritarian ("casual") manner toward participants. Participants exposed to the authoritarian experimenter were said to have received the ego-involving manipulation. In the second approach, participants were ego involved by being

told that their performance on the experimental task had some evaluative dimension (e.g., their professor would be told the results, results were predictive of college success, etc.). Under either of these "ego-involving" conditions, authoritarian participants demonstrated higher levels of cognitive rigidity than under the non- "ego-involving" conditions (see Stone et al., 1993 for a review). According to these researchers, the level of involvement of the participant's ego is key in interfering with their ability to adequately perform cognitive tasks.

However, a different interpretation of these results is possible. Rather than ego-involvement (defined as the greater emotional and/or personal connection with the problem-solving task), it may be that what the authoritarian participants experienced as a result of these manipulations was a fearful reaction to some perceived threat. According to Altemeyer (1996), authoritarian individuals are more likely than non-authoritarians to be generally fearful. In one experiment, he found that scores on his Fear of a Dangerous World Scale (FDWS) were moderately correlated with various measures of authoritarian aggression. Also, in earlier research Altemeyer (1988) had discovered that high RWA people were more likely to have been taught by their parents to fear threats to ordinary societal conventions. Thus, there is some evidence for a greater level of fearfulness among more authoritarian individuals.

Another recent line of research (Feldman & Stenner, 1997) provides further evidence for an interaction between certain types of threat and authoritarianism. While most of the literature concerning threat and authoritarianism hypothesizes that authoritarianism increases with perceived levels of societal threat and decreases when that

threat is removed, these authors suggest instead that it is not authoritarianism itself that increases under threatening conditions, but rather the interaction between authoritarianism and the behaviours and attitudes that result from it. In other words, they suggest that it is authoritarian behaviour (e.g., intolerance) that increases in the face of threat, rather than changes in the underlying authoritarianism trait: Threat activates authoritarianism, but does not create it. Using child-rearing values as a proxy for authoritarianism, Feldman and Stenner used data from the 1992 US National Election Studies pre-post election survey to gather information about the effects of an authoritarianism-threat interaction on multiple measures of authoritarian behaviours and attitudes (e.g., stereotyping, intolerance, punitiveness). They found that the presence of threat significantly magnified the link between authoritarian predisposition and authoritarian behaviours and attitudes. Indeed, when threats were absent, there was little relation between authoritarian predisposition and authoritarian behaviour. They conclude that "threat appears to be critical to the activation of authoritarianism" (1997, p. 765).

Particularly relevant to the present study is Feldman and Stenner's (1997) finding that political threat appears to be especially salient to authoritarians; their most consistent result was the interaction effect of authoritarianism and "perceived ideological diversity" on punitive, intolerant, and prejudicial behaviour. Based on these findings, it is possible to offer an alternative explanation for the findings of the *Einstellung* studies as well as those of the present study. In the *Einstellung* studies, threat was present only for those high-authoritarians who were exposed to the "ego-involving" manipulation. Therefore, only those authoritarians exposed to such a threatening condition performed poorly on the

cognitive task. However, in the present study, political threat may have been perceived by high-authoritarians in either experimental condition -- it may be that merely the explicit pitting of environmental against economic needs aroused the perception of a political threat, perhaps even in the same "perceived ideological diversity" form found by Feldman and Stenner (1997). This political threat may then have triggered a more authoritarian response. In this particular study, that authoritarian response took the form of more cognitively simple and unintegrated responses to the dilemma. A similar phenomenon is presumably at work in the *Einstellung* studies, where personal threats induced authoritarians to demonstrate greater cognitive rigidity. Although Feldman and Stenner did not investigate the possibility of a cognitive mediator for increased authoritarian behaviour, it is not implausible that the restriction of critical cognitive capacities is at least partly implicated in their findings of increased intolerance, punitiveness, and prejudice. Future research could explore this question more directly by experimentally manipulating levels of personal/political threat and then examining both the content and the cognitive structure of authoritarians' reasoning about particular social or political issues.

The nature of the problem-solving task employed in the present study lends another added dimension to previous findings that authoritarians are less cognitively complex than their non-authoritarian counterparts. In the *Einstellung* studies, for example, participants are asked to solve arithmetic water-glass puzzles, with the social conditions of the experiment changing within and between experiments. In contrast, the problem-solving task used in the present study required participants to solve social problems rather than just changing the social context of the problem-solving scenario. Thus we do not need to

infer from decontextualized cognitive games that people high in authoritarianism will demonstrate lower cognitive complexity in solving certain social problems. We can observe it more directly by asking them to perform precisely that kind of problem-solving task.

Of course, it is not possible to determine with this type of research whether high-RWA individuals are cognitively predisposed to prefer simple over complex ideologies, or whether their cognitive simplicity stems from experience with ideologies that are simpler in some respects. According to Altemeyer (1996), authoritarians are more prone than non-authoritarians to a number of cognitive weaknesses. For instance, they have more difficulty making correct inferences from evidence, compartmentalize their thinking more than others, and are more prone than others to making the fundamental attribution error. High RWAs are also more inclined than low RWAs to submit to authorities' views of what is right and wrong; they are simply more credulous of teachings put forward by those conventionally in authority. As a result of this reliance on the teachings of conventional authorities, high RWAs have less experience than low RWAs in using critical appraisal to determine for themselves what is true and false (Altemeyer, 1996). By extension, we can assume that they have less experience in weighing and assessing the various dimensions or aspects of a problem in order to reach their own solutions. This lack of experience with weighing the aspects of a problem may be implicated in the fact that high authoritarians demonstrate a lower degree of integrative cognitive complexity using the Schroder et al. (1967) scoring system. Research should continue to explore the association of integrative cognitive complexity to authoritarianism, and extend the approach to encompass other

content areas.

Also in line with existing research (e.g., Altemeyer 1988, 1996) was the finding that Canadians scored significantly lower on the RWA scale than did non-Canadians. Although it was outside the scope of the present study to investigate these findings in more detail, a potential avenue of future research would be to explore these findings in more depth. Given the cultural diversity of people who are Canadian citizens, it may be worthwhile to study the relationship between ethnocultural background and authoritarianism, rather than continuing to simply delete non-Canadian (or non-US) participants from research samples.

Authoritarianism and Environmental Concern

Although the present study found good evidence for a link between RWA scores and cognitive complexity, it failed to provide evidence for the predicted link between environmental concern (as measured by the NEP) and right-wing authoritarianism. Despite findings in several other studies (e.g., Schultz & Stone, 1994; Altemeyer, 1996) of a negative correlation between environmental concern and RWA scores, no such evidence emerged from the present study. The correlation between NEP and RWA scores ($r = .0469$) was not significant, and analysis of variance revealed no significant differences between the mean NEP scores of high and low RWAs.

The reasons for the absence of such a finding are unclear. It may be simply that the restricted sample size of the present study was insufficient to detect a significant difference among the NEP scores of high and low RWAs. However, this seems unlikely since the present sample was larger than that used in the Schultz and Stone (1994) study ($n = 87$),

where a statistically significant negative correlation was found ($r = -.54$). Scores on the NEP were comparable in both studies (Schultz & Stone: $M = 5.73$ for women; $M = 5.67$ for men; present study $M = 5.53$). However, scores on the RWA were somewhat less comparable, with Schultz and Stone's (1994) sample scoring 4.11 on average (statistically converted to Altemeyer's 9-point scale for comparison with the present study) and the participants in the present study scoring 5.66 on average. It seems unlikely, though, that higher RWA scores in the present study should result in a smaller negative correlation with NEP scores; if anything, the opposite should be the case. All else being equal, higher scores on the RWA scale should result in a larger negative correlation with NEP scores.

Another possibility is that the present study was contaminated by demand characteristics. It is possible that participants in a study called "Student Responses to Environmental Dilemmas" responded differently to the NEP scale than they otherwise would have. Systematically biased responding could have obscured any existing negative correlation between scores on the NEP and RWA scales. However, even when statistically controlling for social desirability, the partial correlation of NEP and RWA remains nonsignificant ($pr = .0763$; $p = .439$). It may be that the demand characteristics operating in the present study were related only to the presentation of socially acceptable environmental views and did not generalize in a way that could be tapped by the Crowne-Marlowe (1960) social desirability scale. In the absence of an adequate explanation for this finding, researchers must continue to investigate the relationship between these two scales.

Machiavellianism and Environmental Concern

Although there was good evidence in the literature for a negative correlation

between NEP and RWA scores, there was relatively little such evidence for a similar association between environmental concern and Machiavellianism. The little evidence in the literature for such a connection was based on commons-dilemma games in which players were more successful the more they exhausted the "natural resources" they were given. Such games are intended as analogs of real-life commons dilemmas, in which individuals over-use public resources for personal gain to such an extent that the resource is eventually exhausted, to everyone's detriment. However, it may be that such experimental games are not good analogs of real-life environmental dilemmas. For instance, it may be that the beliefs and attitudes measured by the NEP do not tap those aspects of the Machiavellian personality that are disinclined to support pro-environmental views. That is, the items on the NEP do not generally pit personal economic gain against environmental preservation in the way that the Smith and Bell experimental game does, and thus there is no self-interest motivation brought out by this questionnaire.

Future research might explore the actual content of high and low Machiavellians' responses to environmental dilemmas to see whether high Machiavellians are more inclined than low Machiavellians to support solutions that lead to personal gain over environmental preservation. In addition, dilemmas would have to be modified to take into account the self-interest considerations related not only to short-term economic gain but also related to personal losses associated with negative environmental impacts that may decrease quality of life. For instance, dilemmas similar to those used in the present study could be modified such that any negative environmental or health impacts would be portrayed as affecting only future generations.

Another reason that Machiavellianism was not significantly related to environmental concern in the present study might be that individuals scoring high on Machiavellianism achieve higher scores in commons-dilemma games for reasons other than their assumed concern for short-term economic gain over long-term resource preservation. Specifically, it may be that high Machiavellians are responding more to the competitive, game-like aspect of such experiments than to the content of the games. Indeed, there is some evidence for the greater competitiveness of high Machs and of their tendency to score higher than low Machs in game-like competitive situations (Fehr et al., 1992; Christie & Geis, 1970). Researchers interested in further investigating this question should control for competitiveness in assessing Machiavellians' levels of environmental concern.

Machiavellianism and Authoritarianism

Although the present study failed to link Machiavellianism to environmental concern, the results are consistent with previous findings (e.g., Altemeyer, 1988; Christie, 1991; Christie & Geis, 1970; Fehr et al., 1992) in that they provided no evidence for a link between scores on Machiavellianism and authoritarianism. This lack of evidence must be further explored, but it may be, as Altemeyer suggests in a recent paper (1997), that the intuitive connection between Machiavellianism and authoritarianism is not non-existent, but rather is masked by the fact that the instruments available for measuring authoritarianism have focused exclusively on the submissive aspects of the authoritarian personality. Instead, Altemeyer proposes, based on his review of recent literature on both Machiavellianism and authoritarianism, that Machiavellianism may be more closely related

to the more dominant aspects of authoritarianism. Indeed, early evidence from the newly developed Social Dominance Orientation (SDO) scale (Pratto, Sidanius, Stallworth & Malle, 1994) would suggest that this may be the case. This scale taps the extent to which one's orientation toward intergroup relations is hierarchical versus equalitarian, yet its items are strongly reminiscent of common authoritarianism-scale items (e.g., "This country would be better off if we cared less about how equal all people were."; "Some people are just more worthy than others."). Preliminary results of research with the SDO scale suggest it is much more strongly correlated with the Mach-IV scale ($r = .54$) than with the RWA scale ($r = -.18$; Altemeyer, 1997). The SDO scale provides a promising way to research the other side of the authoritarian coin: In order that submissive authoritarians may follow, someone must lead.

Machiavellianism and Integrative Cognitive Complexity

Despite the anticipated absence of a strong relationship between the Christie and Geis Machiavellianism scale and the Altemeyer RWA scale, it had been the intention of the present study to show that these two variables might be similar to one another with respect to cognitive style. Specifically, it was hypothesized that people scoring high on Machiavellianism might demonstrate a lower degree of cognitive complexity than their low-Mach counterparts, thus making the high Machs similar to high RWAs. Because high-Machs are more likely to use self-interest as the primary ideology or guiding principle in decision-making, it was argued, they should score lower on the Schroder et al. (1967) measure of cognitive complexity. However, the results of the cognitive complexity scoring revealed no evidence that high and low Machiavellians differed in the degree of cognitive

complexity they used in solving the environmental dilemmas. Although the relationships between Machiavellianism and cognitive complexity were in the expected direction, they did not reach statistical significance. For example, the small negative correlation between Machiavellianism and integrative cognitive complexity was not statistically significant ($r = -.14, p = .14$), and scores on cognitive complexity did not significantly differentiate between high ($M = 3.31$) and low ($M = 3.57$) Machiavellians. These correlations and means remained virtually unchanged in analyses that controlled for social desirability, perceived involvement, and/or NEP scores.

One potential explanation for the absence of such a finding is suggested by Schroder et al.'s (1967) theorizing on integrative cognitive complexity. As they point out, integrative cognitive complexity is not a fixed personality trait, but rather varies with training and/or stimulus condition. In the present study, it was hypothesized that high Machiavellians would demonstrate less cognitive complexity than low Machiavellians because of an interaction between particular personality attributes of Machiavellians and the specifics of the environmental dilemma used. Specifically, it was hypothesized that Machiavellians may propose simpler solutions (those solutions using primarily self-interest as a guiding principle in decision-making) because these are likely to offer the most short-term gain, and that a Machiavellian is unlikely to be concerned with the very long-term effects of environmental destruction because they will not directly affect him or her. However, the dilemmas used in the present study may not have been adequately constructed to detect such a phenomenon. In the high-involvement dilemma, high-Mach participants could have used self-interest as the guiding principle leading them to consider

both the economic benefits of building the chemical factory and the detrimental impact of this factory on one's own health and quality of life. The need to balance these two considerations for the sake of self-interest may have prevented even the high-scoring Machiavellians from proposing very simple solutions. In the low-involvement dilemma, the same considerations apply. That is, a high-Machiavellian person, asked to take the perspective of a resident of some distant town, will be faced with conflicting considerations of environment versus jobs, but both of these can ultimately be interpreted by the high-Mach as purely considerations of self-interest.

Future research could examine the Machiavellian's responses to dilemmas that more deliberately pitted short-term personal economic gain against the long-term collective gain of environmental preservation. Dilemmas that do this would be able to determine whether, in the commons-dilemma experiments, it is the game-like nature of the interaction that determines participants' responses or if it is a genuine disregard for long-term sustainability when faced with short-term personal gain. In addition, researchers investigating the association of Machiavellianism to cognitive style may wish to vary the content of the prompts used in order to explore whether Machiavellians' cognitive complexity varies systematically with content area.

Other Correlates of Environmental Concern

As predicted, the results of the present study indicate that high scores on the NEP were positively associated with scores on integrative cognitive complexity. This correlation is very likely a result of the fact that people scoring highest on a measure of environmental concern are also most likely to be well-informed about environmental

issues. Consequently, such individuals have access to a greater number of unique evaluative dimensions along which to compare potential solutions to the environmental dilemmas, and also have more exposure to and practice with relatively complex and integrated ways of combining those dimensions.

Another association involving NEP scores that was not predicted was the positive correlation between NEP scores and perceived involvement. The most likely explanation for this relation seems to be that people scoring high on a measure of environmental concern would already be more involved than other participants in environmental issues. Thus, when presented with a dilemma involving such issues, their level of perceived involvement in solving the dilemma should quite naturally be higher than that of someone who scores low on environmental concern.

Social Desirability Effects

The existing evidence for a link between Machiavellianism and social desirability was supported by the present study's findings. Most research employing Christie and Geis's (1970) Mach-IV scale routinely includes a standard measure of social desirability to control for this problem. However, the same is not true for research on authoritarianism using Altemeyer's (1996) RWA scale. The evidence for an association between social desirability and scores on the RWA was unmistakable in the present study ($r = .33, p < .001$). Given the nature of the questions on the RWA scale, it should not be surprising that some participants would be inclined to respond in a socially desirable fashion. For example, items designed to assess attitudes toward homosexuality, women's rights, and child-rearing practices are sensitive topics (some would say increasingly so in the 1990s)

to which people with unpopular attitudes may respond disingenuously. Despite this, scores on the RWA in the present study ($M = 169.98$) were actually somewhat higher than scores from typical student sample (e.g., $M = 125$ on average for University of Manitoba students; Altemeyer, 1996).

It is difficult to know the reason for the higher RWA and social desirability scores in the present sample. Perhaps participants believed that responding to RWA questions in a more authoritarian direction was more socially desirable than responding in a less authoritarian direction. If this is the case, it would mean that the supposed push toward more "politically correct" attitudes has had little impact on at least some participants in the present study. Another reason for the higher RWA scores found in the present study may be that the mean age of the participants was somewhat higher ($M = 24.7$ to 26.5) than that of Altemeyer's typical sample ($M = 19$ years). According to Altemeyer, a number of studies have found positive correlations between age and RWA scores.

Despite the association found between RWA and social desirability scores, other research does not appear to have even investigated the possibility of contamination from socially desirable responding. Altemeyer (1981, 1988, 1996, 1997) does not report on the use of a social desirability scale in his own or others' research using the RWA scale. Although Altemeyer (1996) does report a procedure that he believes ensures against a social desirability bias in his research,⁵ a preferred strategy would be to include a

5

Instead, Altemeyer uses a "secret number" procedure in which he asks students to put a number of their choosing on their surveys instead of their names. The anonymity guaranteed by this procedure is the only safeguard in Altemeyer's studies against socially desirable responding.

standardized measure of social desirability such as the Marlowe-Crowne social desirability scale (1960) to ensure standardization of the research on authoritarianism.

Summary and Conclusions

Overall, the results of the present study provide good evidence for a negative association between authoritarianism and integrative cognitive complexity. Even when controlling for the effects of perceived involvement and social desirability, high RWAs achieved lower cognitive complexity scores on average than did low RWAs. This result stands out as unique in the literature on authoritarianism and cognitive style. It also opens possibilities for interested researchers to further explore the role of involvement and problem-solving content in determining the degree of cognitive complexity used by more authoritarian individuals. The possibility that perceived threat may act as a trigger for authoritarian behaviour seems an especially promising avenue of future research.

Another research question that deserves to be further explored relates to the developmental origins of authoritarian cognition. Since Altemeyer's social-learning model of right-wing authoritarianism has effectively replaced Adorno et al.'s psychodynamic approach in much of the research and literature, there has been a relative absence of work on the roots of the more rigid and simpler structure of authoritarian cognition. No researcher has yet explained whether restricted cognitive functioning is the cause or the result of authoritarian attitudes and behaviours. That is, it remains unclear whether rigid and/or simple cognition predisposes one to prefer authoritarian ideologies, or whether experiences of authoritarian ideologies predispose one to employ more rigid and/or simple modes of cognition.

Another area that deserves further attention is the association between authoritarianism and environmental concern. Only a few studies have explored the link between these, and most studies have found the two to be negatively associated. However, the absence of such a finding in the present study raises concerns, especially given the relatively high mean scores on the RWA scale in the present sample. Researchers interested in environmental concern may also wish to pursue the study of Machiavellian personality. Although there are good theoretical reasons to expect a negative association between the two, very little evidence has accumulated to date, primarily because the question has not often been posed. Researchers need to expand their repertoire of strategies for investigating environmental concern, Machiavellianism, and authoritarianism.

Although there was no evidence in the present study that high and low Machiavellians differed in their degree of cognitive complexity, there remain questions about the generalizability of these results. Studies of Machiavellian cognition need to be refined in order to tap the specific dimensions (i.e., self-interest) that may influence the degree of complexity demonstrated and to control for the competitiveness that may influence results when Machiavellians participate in traditional commons-dilemma research.

Finally, the significant correlation between authoritarianism and social desirability in the present study raises serious concerns about the validity of authoritarianism research using the RWA scale. Since standard measures of social desirability have not been used in published RWA research, the present findings must be replicated before any conclusions can be drawn. However, it seems likely that a scale tapping so many sensitive topics would

have an element of socially desirable responding, and that social desirability should be a standard concern in this type of research.

Implications

In recent years, the study of authoritarianism has enjoyed a renewed popularity within psychology. However, a large majority of the resulting studies have been correlational studies relating scores on authoritarianism to scores on other measures of attitude and/or personality. The present study expands on that approach by adding the study of cognitive style in solving a particular social problem. It also contributes to the literature in that it investigates the link between ego/emotional involvement and authoritarianism, using the newer RWA scale. According to Stone et al. (1993), the study of the emotional aspects of the authoritarian personality are an important potential area of research. Since the problems encountered by *TAP* (Adorno et al., 1950), the psychodynamics of authoritarianism has been almost ignored in the authoritarianism literature. Thus a revival of research in this area should widen the focus of psychological research on authoritarianism.

In terms of the Machiavellianism literature, the present study contributes to an improved understanding of the cognitive processes of Machiavellians by showing that high and low Machiavellians do not differ in their preference for simple or complex solutions to environmental problems. It also contributes an empirical test of Christie and Geis's assertion that high Machs are more able than low Machs to screen out emotional considerations and attend to the task at hand. The fact that high and low Machs did not differ on their self-reported involvement scores provides evidence that contradicts their

claim, as does the evidence that high and low Machs did not differ in their scores on cognitive complexity based on their assignment to high- or low-involvement environmental dilemmas.

Finally, the present study contributes to social psychology's growing understanding of environmental beliefs and attitudes. In examining the integrative complexity of the reasoning people use in attempting to solve hypothetical environmental dilemmas, this study adds a unique perspective to the psychological literature on environmentalism, which has thus far focused mostly on the content of environmental beliefs and attitudes. It is hoped that this perspective will contribute in some small way to efforts at solving real environmental problems.

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Appendix A
Ethics Application

Department of Psychology
PROPOSAL FOR RESEARCH WITH HUMAN SUBJECTS

1. Date of This Submission: 30 January 1997
2. Faculty Sponsor: Dr. Lloyd Strickland
Telephone: 520-2600 Ext. 2703
3. Principal Investigator: Rachelle Thibodeau
Telephone: 520-2600 Ext. 2655
4. Other Research Personnel: Allan Blunt (reliability coder)
5. Project Title: Integrative Complexity in Reasoning about the Natural Environment: An Investigation of Authoritarianism and Machiavellianism.
6. Type of Research: MA Thesis
7. Approximate Start and Completion Dates:
February, 1998 to September 1998
8. Approximate Duration of Testing Session(s): 1 hour
10. Number, age, and source of subjects:
Approximately 160 adult volunteers drawn from 49.100 subject pool.
11. Checklist: Are the following included with this submission?

Description of Purpose	YES
Procedure (including materials)	YES
Informed Consent	YES
Written Debriefing	YES
Announcement for Recruiting	YES
12. Does the study involve anything that might cause subjects anxiety, pain or embarrassment? NO
13. Does the study involve deception? YES

I acknowledge that subjects will be treated in accordance with the ethical guidelines of the Canadian Psychological Association. In accordance with the CPA ethical guidelines, I acknowledge that it is my responsibility to respect COPYRIGHT Laws.

Principal Investigator: _____ Project Supervisor: _____

Appendix B

**Recruitment Poster and
Sign-up Sheet**

STUDENT RESPONSES TO ENVIRONMENTAL DILEMMAS

This study is about student attitudes and responses to common environmental scenarios. The study takes about an hour to complete. If you would like to participate, please sign up on one of the sheets located under this one.

Experimenter: **Rachelle Thibodeau**
Office: Loeb A434 (not experiment location)
Phone: 788-2600, Ext. 2655
E-mail: rthibode@ccs.carleton.ca

Location of Experiment: See sign-up sheets under this page for room numbers.

Important: Please sign up for this study only if you filled out the "mass testing" questionnaires at the beginning of last semester.

Participants will receive **one credit** for participating in this experiment.

YOU MUST KEEP A RECORD OF:

- * THE EXPERIMENTER'S NAME
- * TITLE OF THE EXPERIMENT
- * LOCATION AND TIME

CHOOSE THE TIME THAT IS BEST FOR YOU ON ONE OF THE SIGN-UP SHEETS UNDERNEATH. PLEASE PROVIDE ALL INFORMATION REQUESTED. THANK YOU.

Experiment Number:
Faculty Advisor: Dr. Lloyd Strickland

SIGN-UP SHEET FOR:
Time and Date of Experiment Here

Write this down!

Experiment title: Student Responses to Environmental Dilemmas

When: (times to be booked)

Where: (locations to be booked)

Experimenter: Rachelle Thibodeau

If you must cancel: 520-2600, ext. 2655, or e-mail rthibode@ecs.carleton.ca

	Initials	Telephone	E-mail (if you use it)	Student Number
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Appendix C

Informed Consent Form

Informed Consent Form

Voluntary informed consent is one of the ways that Carleton University provides for the safety and well-being of research participants. By giving your signed consent below, you agree to respond to the following questionnaires and the scenarios about environmental issues. Your responses will be kept strictly confidential and will be used for research purposes only. Your participation is completely voluntary, and you may withdraw from the study at any time.

My name and telephone number as well as the names and telephone numbers of other people in the Department of Psychology who are connected with this study are provided on the next page. Please keep this page for future reference.

Please indicate your informed consent to voluntarily participate in this study by signing below.

Participant name (Please print)

Date

Signature

Information:

If you would like any further information about this study, please contact:

Rachelle Thibodeau
Department of Psychology
Carleton University
520-2600 Ext. 2655
e-mail:
rthibode@ccs.carleton.ca

or

Dr. Lloyd Strickland
Department of Psychology
Carleton University
520-2600 Ext. 2703
e-mail:
lstrick@ccs.carleton.ca

Concerns:

If you have any concerns that were not adequately addressed by the investigators listed above, please contact:

Dr. Kim Matheson
Chair
Department of Psychology
Carleton University
520-2600 Ext. 7513

or

Dr. Mary Gick
Chair, Ethics Committee
Department of Psychology
Carleton University
520-2600 Ext. 2664

Please keep this page for future reference.

Appendix D**Verbal Instructions for Participants**

(The following script will be read to all research participants once they have completed their informed consent forms.)

First, I would like to thank everyone for participating in this study. First-year psychology students make an important contribution to psychology research at Carleton. The study you are helping with today is about various social attitudes and traits and about student responses to environmental dilemmas. The entire study should take about 50 minutes to complete.

In a minute, I will hand to each of you a questionnaire package. I have two requests to make regarding these. First, please answer all the questions. Second, please fill out the pages in the order that they are presented to you. If you finish early, please turn your questionnaire package face down in front of you on the table and try not to disturb the other students. Everyone will be dismissed at the same time, so there is no need to rush through the questionnaires.

(For groups completing the environmental dilemmas first, the following section will be read at the beginning.)

The first exercise in your booklet is a timed one. I will ask you to read the environmental scenario and then to wait until I tell you to begin writing. You will have ten minutes to write down your thoughts. There are no right or wrong answers, just write what you honestly think. Remember, what you write is strictly confidential and will be used only for research purposes.

(For participants completing the environmental dilemmas last, the questionnaires will be handed out and completed first, and then the dilemmas will be handed out. The following section will be read after everyone has completed the questionnaire portion. Participants will be asked to hand in their entire package together in an envelope. This will ensure that the two components of the study remain together.)

Now that you have all completed part one of the study, I will hand out part two. Keep part one in front of you and hand in both parts in your envelope when you have finished. This exercise is a timed one. I will ask you to read the environmental scenario and then to wait until I tell you to begin writing. You will have ten minutes to write down your thoughts. There are no right or wrong answers, just write what you honestly think. Remember, what you write is strictly confidential and will be used only for research purposes.

Appendix E**Mach-IV Scale****RWA Scale****Marlowe-Crowne Social Desirability Scale****NEP Scale**

(Mach-IV Scale, Zook & Sipps, 1986)

Please answer the questions below using the following scale. Do not spend too much time on any one question.

- 7 = strongly agree
- 6 = moderately agree
- 5 = slightly agree
- 4 = neither agree nor disagree
- 3 = slightly disagree
- 2 = moderately disagree
- 1 = strongly disagree

- _____ 1. There is no excuse for lying to someone else.
- _____ 2. Honesty is the best policy in all cases.
- _____ 3. When you ask someone to do something for you, it is best to give the real reasons for wanting it rather than giving reasons which carry more weight.
- _____ 4. All in all, it is better to be humble and honest than to be important and dishonest.
- _____ 5. It is wise to flatter important people.
- _____ 6. The best way to handle people is to tell them what they want to hear.
- _____ 7. Most people who get ahead in the world lead clean, moral lives.
- _____ 8. It is possible to be good in all respects.
- _____ 9. Anyone who completely trusts anyone else is asking for trouble.
- _____ 10. It is safest to assume that all people have a vicious streak and it will come out when they are given a chance.
- _____ 11. Never tell anyone the real reason you did something unless it is useful to do so.
- _____ 12. One should take action only when sure it is morally right.
- _____ 13. The biggest difference between most criminals and other people is that the criminals are stupid enough to get caught.

- _____ 14. Generally, people won't work hard unless they're forced to do so.
- _____ 15. Most people are brave.
- _____ 16. It is hard to get ahead without cutting corners here and there.
- _____ 17. People suffering from incurable diseases should have the choice of being put painlessly to death.
- _____ 18. Most people forget more easily the death of a parent than the loss of their property.
- _____ 19. Barnum was very wrong when he said there's a sucker born every minute.
- _____ 20. Most people are basically good and kind.

(RWA Scale, Altemeyer, 1996)

This survey is part of an investigation of general public opinion concerning a variety of social issues. You will probably find that you *agree* with some of the statements, and *disagree* with others, to varying extents. Please indicate your reaction to each of the statements by writing a number next to each item in the space provided, according to the following scale:

In the space provided, please write:

- 4 if you *very strongly disagree* with the statement.
- 3 if you *strongly disagree* with the statement.
- 2 if you *moderately disagree* with the statement.
- 1 if you *slightly disagree* with the statement.

In the space provided, please write:

- +1 if you *slightly agree* with the statement.
- +2 if you *moderately agree* with the statement.
- +3 if you *strongly agree* with the statement.
- +4 if you *very strongly agree* with the statement.

If you feel exactly and precisely *neutral* about a statement, please write "0" in the space provided.

You may find that you sometimes have different reactions to different parts of a statement. For example, you might very strongly disagree ("-4") with one idea in a statement, but slightly agree ("+1") with another idea in the same item. When this happens, please combine your reactions, and write down how you feel "on balance" (that is, a "-3" in this example).

- _____ 1. Life imprisonment is justified for certain crimes.
- _____ 2. Women should have to promise to obey their husbands when they get married.
- _____ 3. The established authorities in our country are usually smarter, better informed, and more competent than others are, and the people can rely upon them.
- _____ 4. It is important to protect the rights of radicals and deviants in all ways.
- _____ 5. Our country desperately needs a might leader who will do what has to be done to destroy the radical new ways and sinfulness that are ruining us.
- _____ 6. Gays and lesbians are just as healthy and moral as anybody else.
- _____ 7. Our country will be great if we honour the ways of our forefathers, do what the authorities tell us to do, and get rid of the "rotten apples" who are ruining everything.

_____ 8. Atheists and others who have rebelled against the established religions are no doubt every bit as good and virtuous as those who attend church regularly.

_____ 9. The *real* keys to the "good life" are obedience, discipline, and sticking to the straight and narrow.

_____ 10. A lot of our rules regarding modesty and sexual behaviour are just customs which are not necessarily any better or holier than those which other people follow.

_____ 11. There are many radical, immoral people in our country today, who are trying to ruin it for their own godless purposes, whom the authorities should put out of action.

_____ 12. It is always better to trust the judgement of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people's minds.

_____ 13. There is absolutely nothing wrong with nudist camps.

_____ 14. There is no "ONE right way" to live life; everybody has to create their *own* way.

_____ 15. Our country will be destroyed someday if we do not smash the perversions eating away at our moral fibre and traditional beliefs.

_____ 16. Homosexuals and feminists should be praised for being brave enough to defy "traditional family values".

_____ 17. The situation in our country is getting so serious, the strongest methods would be justified if they eliminated the troublemakers and got us back to our true path.

_____ 18. It may be considered old fashioned by some, but having a normal, proper appearance is still the mark of a gentleman and, especially, a lady.

_____ 19. Everyone should have their own lifestyle, religious beliefs, and sexual preferences, even if it makes them different from everyone else.

_____ 20. A "woman's place" should be wherever she wants to be. The days when women are submissive to their husbands and social conventions belong strictly in the past.

_____ 21. What our country really needs is a strong, determined leader who will crush evil, and take us back to our true path.

_____ 22. People should pay less attention to the Bible and the other old traditional forms

of religious guidance, and instead develop their own personal standards of what is moral and immoral.

_____ 23. The only way our country can get through the crisis ahead is to get back to our traditional values, put some tough leaders in power, and silence the troublemakers spreading bad ideas.

_____ 24. Our country *needs* free thinkers who will have the courage to defy traditional ways, even if this upsets many people.

_____ 25. There is nothing wrong with premarital sexual intercourse.

_____ 26. It would be best for everyone if the proper authorities censored magazines so that people could not get their hands on trashy and disgusting material.

_____ 27. It is wonderful that young people today have greater freedom to protest against things they don't like and to make their own "rules" to govern their behaviour.

_____ 28. What our country *really* needs, instead of more "civil rights," is a good stiff dose of law and order.

_____ 29. Some of the best people in our country are those who are challenging our government, criticizing religion, and ignoring the "normal way" things are supposed to be done.

_____ 30. Obedience and respect for authority are the most important virtues children should learn.

_____ 31. Nobody should "stick to the straight and narrow." Instead, people should break loose and try out lots of different ideas and experiences.

_____ 32. Once our government leaders give us the "go ahead," it will be the duty of every patriotic citizen to help stomp out the rot that is poisoning our country from within.

_____ 33. We should treat protestors and radicals with open arms and open minds, since new ideas are the lifeblood of progressive change.

_____ 34. The facts on crime, sexual immorality, and the recent public disorders all show we have to crack down harder on deviant groups and troublemakers if we are going to save our moral standards and preserve law and order.

(Marlowe-Crowne Social Desirability Scale, Crowne & Marlowe, 1960)

(Socially desirable response is indicated in parentheses at the end of each question.)

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true (T) or false (F) as it pertains to you personally.

- ___ 1. Before voting I thoroughly investigate the qualifications of all the candidates. (T)
- ___ 2. I never hesitate to go out of my way to help someone in trouble. (T).
- ___ 3. It is sometimes hard for me to go on with my work if I am not encouraged. (F)
- ___ 4. I have never intensely disliked anyone. (T)
- ___ 5. On occasion I have had doubts about my ability to succeed in life. (F)
- ___ 6. I sometimes feel resentful when I don't get my way. (F)
- ___ 7. I am always careful about my manner of dress. (T)
- ___ 8. My table manners at home are as good as when I eat out in a restaurant. (T)
- ___ 9. If I could get into a movie without paying and be sure I was not seen I would probably do it. (F)
- ___ 10. On a few occasions, I have given up doing something because I thought too little of my ability. (F)
- ___ 11. I like to gossip at times. (F)
- ___ 12. There have been times when I felt like rebelling against people in authority even though I knew they were right. (F)
- ___ 13. No matter who I'm talking to, I'm always a good listener. (T)
- ___ 14. I can remember "playing sick" to get out of something. (F)
- ___ 15. There have been occasions when I took advantage of someone. (F)
- ___ 16. I'm always willing to admit it when I make a mistake. (T)

- ___ 17. I always try to practice what I preach. (T)
- ___ 18. I don't find it particularly difficult to get along with loud mouthed, obnoxious people. (T)
- ___ 19. I sometimes try to get even rather than forgive and forget. (F)
- ___ 20. When I don't know something I don't at all mind admitting it. (T)
- ___ 21. I am always courteous, even to people who are disagreeable. (T)
- ___ 22. At times I have really insisted on having things my own way. (F)
- ___ 23. There have been occasions when I felt like smashing things. (F)
- ___ 24. I would never think of letting someone else be punished for my wrongdoings. (T)
- ___ 25. I never resent being asked to return a favour. (T)
- ___ 26. I have never been irked when people expressed ideas very different from my own. (T)
- ___ 27. I never make a long trip without checking the safety of my car. (T)
- ___ 28. There have been times when I was quite jealous of the good fortune of others. (F)
- ___ 29. I have almost never felt the urge to tell someone off. (T)
- ___ 30. I am sometimes irritated by people who ask favours of me. (F)
- ___ 31. I have never felt that I was punished without cause. (T)
- ___ 32. I sometimes think when people have a misfortune they only got what they deserved. (F)
- ___ 33. I have never deliberately said something that hurt someone's feelings. (T)

(New Environmental Paradigm Scale, Dunlap & Van Liere, 1978)

Please circle your answers to the following questions according to the scale provided.

1 = strongly disagree
2 = moderately disagree
3 = slightly disagree

4 = completely neutral

5 = slightly agree
6 = moderately agree
7 = strongly agree

1. We are approaching the limit of the number of people the Earth can support.

1 2 3 4 5 6 7

2. The balance of nature is very delicate and easily upset.

1 2 3 4 5 6 7

3. Humans have the right to modify the natural environment to suit their needs.

1 2 3 4 5 6 7

4. Humankind was created to rule over the rest of nature.

1 2 3 4 5 6 7

5. When humans interfere with nature it often produces disastrous consequences.

1 2 3 4 5 6 7

6. Plants and animals exist primarily to be used by humans.

1 2 3 4 5 6 7

7. To maintain a healthy economy we will have to develop a "steady-state" economy where industrial growth is controlled.

1 2 3 4 5 6 7

8. Humans must live in harmony with nature in order to survive.

1 2 3 4 5 6 7

9. The Earth is like a spaceships, with only limited room and resources.

1 2 3 4 5 6 7

10. Humans need not adapt to the natural environment because they can remake it to suit their needs.

1 2 3 4 5 6 7

11. There are limits to growth beyond which our industrialized society cannot expand.

1 2 3 4 5 6 7

12. Humankind is severely abusing the environment.

1 2 3 4 5 6 7

Appendix F

**Environmental Dilemmas and
Manipulation Check**

(Low-involvement dilemma)

In a medium-sized Scandinavian town, there is currently a debate about whether or not to allow the building of a large chemical factory. On one hand, proponents of the factory argue that the town badly needs jobs which the new factory could provide. Furthermore, the company proposing to build the factory has a record of treating its employees fairly and providing good pay and benefits. On the other hand, the factory's opponents argue that the factory could cause considerable harm to the town's natural environment. In other towns where the same company has built similar factories, the chemical waste from the factories has resulted in decreased air and water quality, causing health problems for some town residents. The long-term effects of the chemical wastes on the environment and on health are unknown.

The town's people are increasingly in conflict about this issue. The deadline for the town to decide whether or not they want the factory is in six months.

What kind of solution(s) do you think the town should adopt for this dilemma and why? Please explain in detail how you think the town should go about making its decision about the factory. Do you think the factory should be built? Why or why not?

Please write your answer neatly in the space provided. You have 10 minutes to complete your response.

(high-involvement dilemma)

Imagine that in your home town, there is currently a debate about whether or not to allow the building of a large chemical factory. On one hand, you badly need a job which the factory could provide. The company proposing to build the factory has a record of treating its employees fairly and providing good pay and benefits. On the other hand, the factory could cause considerable harm to your town's natural environment. In other towns where the same company has built similar factories, the chemical waste from the factories has resulted in decreased air and water quality, causing health problems for some town residents. The long-term effects of the chemical wastes are unknown. Whatever the effects, you are very likely to be affected, since your family home is both down-wind and down-stream from the proposed site for the new factory.

The people in your town are increasingly in conflict about this issue. The deadline for your town to decide whether or not you want the factory is in six months.

What kind of solution(s) do you think your town should adopt for this dilemma and why? Please explain in detail how you think your town should go about making its decision about the factory. Do you think the factory should be built? Why or why not?

Please write your answer neatly in the space provided. You have 10 minutes to complete your response.

(Manipulation Check)

In the space provided, please write:

- 4 if you *very strongly disagree* with the statement.
- 3 if you *strongly disagree* with the statement.
- 2 if you *moderately disagree* with the statement.
- 1 if you *slightly disagree* with the statement.

In the space provided, please write:

- +1 if you *slightly agree* with the statement.
- +2 if you *moderately agree* with the statement.
- +3 if you *strongly agree* with the statement.
- +4 if you *very strongly agree* with the statement.

If you feel exactly and precisely *neutral* about a statement, please write "0" in the space provided.

____ While reading about the environmental dilemma and writing down my proposed solutions, I felt *emotionally* involved.

____ While reading about the environmental dilemma and writing down my proposed solutions, I felt *personally* involved.

Appendix G
Demographics Questionnaire

Demographics Questionnaire

Your answers to the following questions will be kept **strictly confidential**, and will be used only for research purposes. Thank you for responding.

Name: _____

Telephone number: _____

Age: _____

Sex (please circle one): Male Female

Nationality: _____

Year in university (please circle one): First Second Third Fourth or higher

Academic Major (if any, or write "undeclared"): _____

Religious affiliation (if any): _____

Political affiliation (if any): _____

Appendix H**Debriefing**

Thank you for your participation!

The purpose of the research in which you have just participated is to develop a better understanding of some factors that influence people's thinking about environmental issues. Specifically, researchers have recently found that certain attitude and personality factors are associated with more flexible and complex solutions to certain mechanical and arithmetic problems. In this study, we are trying to find out whether this finding also applies to environmental problems. It is hoped that your responses to the questionnaires and environmental scenarios will contribute to a further understanding of these links.

If you have any questions about this project, or if you would like to receive a copy of the results, please do not hesitate to contact me. Results should be available by September 1998.

Thanks again for participating!

Appendix I**Integrative Complexity Coding Scheme**

Integrative Complexity Coding Scheme

Differentiation Coding

<u>Score</u>	<u>Pattern</u>
1	<u>low differentiation</u> : respondent is not aware of alternative ways of interpreting the issue and/or relies on a rigid, dichotomous rule to make decisions about the issue.
2	...
3	<u>moderate differentiation</u> : respondent recognizes two alternative points of view on the issue.
4	...
5	<u>high differentiation</u> : respondent recognizes multiple perspectives on the issue.

Note: Scores of 2 and 4 represent transition points between levels of differentiation. Such scores are assigned when the requirements for a higher score are met, but must be inferred rather than being explicitly stated by the respondent.

Integration Coding

<u>Score</u>	<u>Pattern</u>
1	<u>low integration</u> : respondent fails to recognize alternative perspectives on the issue <i>or</i> recognizes alternative perspectives but fails to see any linkage between them.
2	...
3	<u>moderate integration</u> : respondent makes explicit attempts to develop guidelines for coping with tradeoffs between desired and undesired effects of a decision and/or attempts to develop comparison rules that explain why reasonable people might take different stands on an issue.
4	...
5	<u>high integration</u> : respondent develops complex rules to compare, contrast, and synthesize multiple perspectives on the issue.

Note: Scores of 2 and 4 represent transition points between levels of integration. Such scores are assigned when the requirements for a higher score are met, but must be inferred rather than being explicitly stated by the respondent.

Combining Differentiation and Integration Scores

<u>Score</u>	<u>Pattern</u>
1	Low differentiation, low integration.
2	...
3	Moderate to high differentiation, low integration.
4	...
5	Moderate to high differentiation, moderate integration.
6	...
7	High differentiation, high integration.

Note: Scores of 2, 4, and 6 represent transition points between adjacent levels.

Description of Integrative Complexity Scores

<u>Score</u>	<u>Description</u>
1	Presents only one side of a problem or presents two sides but only to dismiss one. Ignores differences, similarities, and gradations.
2	One side of the problem presented and supported much more fully than the other. Opposing views perceived as compartmentalized or negative. No interrelationships considered.
3	Two or more views clearly differentiated. Similarities and differences implied or presented. One view can be opposed, but it is understood.
4	Includes all involved under scale point 3 but begins to consider the similarities and differences between views. At this level, consideration is expressed . . . as qualifications of each . . . (for example, "similar, but . . ."). That is, the simultaneous effects of alternate views become apparent in the writer's thinking.
5	Considers alternate and conflicting reasons for perceived similarities and differences between views in producing the essay.
6	Begins to consider relationships, not only among direct similarities and differences between sides of the problem, but also relationships between alternate reasons as to why the differences and similarities occur.
7	The consideration of notions which include relational linkages between alternate views. Such notions are open to all conflicting components and express attempts to see these as parts of a more inclusive "construction" of the problem.

Appendix J

Analysis of Non-Canadians' Data

Analysis of Non-Canadians' Data

Although Altemeyer (1988, 1996) recommends deleting data from non-Canadian or non-US participants, it was felt that differences and similarities between Canadian and non-Canadian participants in the present study might be informative. Furthermore, given that the assignment of the labels "Canadian" and "non-Canadian" in the present study was not unproblematic, it was felt that further analysis could be conducted. In order that the data could be examined in their totality, a second complete set of analyses was conducted with the non-Canadian participants included. Descriptive statistics were computed, correlations among key variables were performed, and analysis of covariance was conducted to determine the effect of RWA, Mach-IV, and NEP scores on integrative cognitive complexity.

First, descriptive statistics were calculated for each of the study's major variables. Means and standard deviations are listed in Table 2 (minimum and maximum possible scale scores are given in parentheses). Analysis of variance revealed that scores on the RWA scale are significantly different for Canadians ($M = 169.98$) and non-Canadians ($M = 184.18$), $F = 8.41$, $p < .01$. Analysis of variance also revealed mean scores on the Marlowe-Crowne Social Desirability scale to be significantly different for Canadians ($M = 13.37$) and non-Canadians ($M = 16.15$), $F = 5.31$, $p < .05$. Mean scores on all other scales did not differ significantly for Canadians and non-Canadians.

Table 2. Descriptive Statistics for Rating Scales (Including non-Canadian Participants).

Scale	Mean Score	Standard Deviation	Sample Size
RWA (30 - 270)	172.68	23.56	138
Mach-IV (40 - 160)	89	13.98	138
NEP (12 - 84)	65.9	9.15	138
Social Desirability (0 - 33)	13.88	5.70	136
Integrative Cognitive Complexity (1 - 7)	3.41	1.57	138
Involvement (-4 - +4)	1.58	3.43	137

Once descriptive statistics had been computed, correlational analyses were conducted to explore the effect of the control variables (NEP, Social Desirability, Perceived Involvement) on the independent (RWA, Mach-IV) and dependent (Cognitive Complexity) variables. As predicted, scores on the NEP were significantly correlated with scores on cognitive complexity ($r = .18, p < .05$). Scores on social desirability were significantly correlated with scores on both RWA ($r = .42, p < .001$) and Machiavellianism ($r = -.30, p < .001$). All of these correlations confirmed the need to remove the effect of the control variables from further analyses. In addition, although scores on perceived involvement were not significantly correlated with scores on RWA, Mach-IV, or cognitive complexity, they were significantly correlated with scores on the NEP ($r = .17, p < .05$).

Therefore, in order to remove any effect of perceived involvement, further analyses also controlled for that variable.

In order that analysis of covariance might be conducted, participants were divided into groups based on a median split of their scores on the RWA and Mach-IV scales, as in the main analysis. Groups of high and low RWAs (median = 173) and high and low Machs (median = 89) were formed. Analysis of variance revealed that high-RWA participants ($M = 193.06$) had significantly higher RWA scores than low-RWA participants ($M = 155.57$), $F(1, 136) = 234.46, p < .0001$. Analysis of variance also revealed that high-Machiavellian participants ($M = 99.74$) had significantly higher Mach-IV scores than low-Machiavellian participants ($M = 76.94$), $F(1, 137) = 273.05, p < .0001$.

Once this division of groups was complete, analysis of covariance was conducted to determine whether any differences on mean cognitive complexity scores could be attributed to scores on RWA or Mach-IV when controlling for the effects of perceived involvement, NEP, and social desirability. However, because scores on NEP were significantly correlated with scores on the dependent measure ($r = .18, p < .05$), employing NEP as a covariate would have violated one of the central assumptions of analysis of covariance (Tabachnick & Fidell, 1983). Therefore, following the method outlined in Tabachnick and Fidell (1983), NEP was converted into another independent variable by assigning participants to high and low NEP groups based on a median-split division of NEP scores (median = 66). Analysis of variance revealed that high-NEP participants ($M = 72.46$) had significantly higher NEP scores than low-NEP participants ($M = 57.86$), $F(1, 136) = 237.41, p < .0001$. In such a procedure, any main effects or

interactions of NEP are simply interpreted as would be main effects and interactions involving any independent variable. On the other hand, social desirability was acceptable as a covariate in the analysis because while it showed a significant correlation with both independent variables (RWA: $r = .43, p < .001$; Mach-IV: $r = -.30, p < .001$), it was uncorrelated with the dependent variable. The same is true of perceived involvement, which showed a significant correlation with the now-independent variable NEP ($r = .17, p < .05$) but not with the dependent variable. Therefore, as in the main analysis, the final ANCOVA was performed using Cognitive Complexity as the dependent variable, RWA, Mach-IV, and NEP as independent variables, and social desirability and perceived involvement as covariates. Results were virtually identical to those obtained in the main analysis, with a significant main effect of RWA on Cognitive Complexity, $F(1, 134) = 10.78, p < .01$, but no other significant main effects or interaction effects.

IMAGE EVALUATION TEST TARGET (QA-3)

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