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Three decades of lay epistemics: The why, how, and who of knowledge formation

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A conceptual integration and review are presented of three separate research programmes informed by the theory of lay epistemics (Kruglanski, 1989). They respectively address the “why”, “how”, and “who” questions about human knowledge formation. The “why” question is treated in work on the *need for cognitive closure* that propels epistemic behaviour and affects individual, interpersonal, and group phenomena. The “how” question is addressed in work on the *unimodel* (Kruglanski, Pierro, Mannetti, Erb, & Chun, 2007) depicting the process of drawing conclusions from the “information given”. The “who” question is addressed in work on “epistemic authority” highlighting the centrality of source effects (including oneself as a source) in human epistemic behaviour. These separate research paradigms explore facets of epistemic behaviour that jointly produce human knowledge, of essential significance to people’s individual and social functioning.

Keywords: Need for closure; Unimodel; Epistemic authority; Rule following; Seizing.

The label *homo sapiens* by which the humankind is designated translates into “the knowing person”, hinting at the essential importance for human affairs of knowledge and its construction. As individuals we form new knowledge constantly and continually. To carry out even the most mundane activities we need to *know* a variety of things. Before embarking on a bit of intelligible behaviour, no matter how small, we need to orientate ourselves in time and space, decide what our implementation intentions are for that particular instant, divine their feasibility under the circumstances, and so on. All these are types of knowledge that individuals need to formulate on a moment-to-moment basis.

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Our social interactions are also suffused with prior knowledge. We quickly form a preliminary impression about our partners' identity (e.g., as regards their age, gender, nationality, or social status). We figure out what language they speak, what they know about a topic at hand, and what their attitudes and opinions are, so that we tailor our communications accordingly. In addition, our lives as group members and participants in larger collectivities (societies or cultures) are fundamentally guided by our shared knowledge of concepts, norms, and world views.

Given the ubiquity of knowledge formation concerns, and their essential psychological relevance to human thought, feeling, and action, understanding how knowledge is formed and changed defines a task of considerable importance for psychological science. Indeed, psychological researchers and theorists have examined epistemic processes in a variety of paradigms including those concerned with attitude formation and change (e.g., Maio & Haddock, 2007; Petty & Wegener, 1999), impression formation (Brewer, 1988; Fiske & Neuberg, 1990), judgement under uncertainty (Kahneman, 2003), and attribution (Hilton, 2007). Typically too, such endeavours, though insightful and useful, have addressed localised issues *specific* to a given content domain of knowledge (for a review see Kruglanski & Orehek, 2007).

More than 20 years ago, a paper published in the *Psychological Review* (Kruglanski, 1980) became the first in what was to become a long string of research reports and essays on the psychological factors involved in a *general* knowledge formation process. A more elaborate theory on this topic was featured in a volume *Lay Epistemics and Human Knowledge* published nearly a decade later (Kruglanski, 1989). Whereas the initial theoretical effort centred on a generalised, lay epistemic interpretation of attribution theory, subsequent work extended the approach to further topics, including cognitive consistency theories, attitudes and attitude change, cognitive therapy, social comparison processes, and the social psychology of science.

Subsequent to this early publication, extensive empirical and conceptual developments in lay epistemics took place under the aegis of three fairly separate research programmes, namely those on *closed mindedness* (see Kruglanski, 2004), the *unimodel* (see Kruglanski et al., 2007), and *epistemic authority* (see Kruglanski et al., 2005). The purpose of the present chapter is to offer an integrative, up-to-date synopsis of this work, affording a bird's eye perspective on knowledge formation processes and their ramifications for a broad variety of social psychological phenomena.

In what follows we first briefly recapitulate the theory of lay epistemics and describe the three separate research programmes it inspired, including the description of substantial novel data not covered in prior reviews. We conclude with a conceptual integration of these research programmes and indicate how the processes that they address form an integral part and parcel

of the knowledge formation enterprise of potentially considerable real-world relevance.

THE THEORY OF LAY EPISTEMICS

The theory of lay epistemics concerns the process of knowledge formation. It outlines a general framework designed to pertain to all kinds of knowledge, scientific and lay, including personal knowledge of people and the world, religious knowledge, political knowledge, etc. Its point of departure has been Karl Popper's (1959) famous assertion that scientific knowledge is formed in the same general manner as lay knowledge, and hence that science is "common sense writ large". Popper and other philosophers of science (e.g., Paul Feyerabend, or Imre Lakatos) have noted that whereas knowledge formation is guided by the ideal of Truth, one can be never certain that this ideal has been realised. This implies that the concept of "knowledge" is best understood in its subjective sense, as a *belief*. This hardly implies that knowledge must be solipsistic or idiosyncratic. All to the contrary, knowledge typically is socially shared, and knowledge construction (whereas scientific or lay) is accomplished via a communal process (Hardin & Higgins, 1996).

According to our theory that regards knowledge as tantamount to belief, to have *knowledge* in which one does not *believe* is a contradiction in terms. However, some authors (e.g., Gawronski & Bodenhausen, 2006) have affirmed such possibility, so let us examine it carefully. For instance, consider an individual who *knows* the contents of some stereotype (e.g., that all professors are absent-minded) yet does not believe in it. Does that represent an inconsistency with our claim that subjective knowledge represents a belief? It does not! The confusion here is one between "believing that" and "believing in". Knowing the contents of a stereotype means that one *believes that* such a stereotype exists. For instance, one may believe very strongly *that* the stereotype of women states that women are relational, conflict avoidant, and nurturing, yet one might not personally subscribe to such a stereotype or *believe in it*. Similarly, one may know or *believe* very strongly *that* the ancient Egyptians believed the Earth to be flat, without oneself believing this to be true, etc.

Evidence

A major assumption of the lay epistemic theory is that knowledge is derived from evidence. In other words the individual is assumed to depart from an inference rule of an "if E then C" type in which the antecedent term represents the evidence (E), and the consequent term the conclusion C. Such conclusion can also be thought of as a hypothesis (H) that is supported by

the evidence.¹ More formally speaking, the reasoning from evidence to conclusions is syllogistic. It includes a *major premise*, the “if E then C” inference rule, and a *minor premise*, which instantiates the antecedent of the rule E affirming that the evidence in question has been obtained, jointly yielding the conclusion C. For instance, a person might subscribe to the stereotype “if university professor then smart” (constituting a major premise), and infer that an encountered individual Dr Smith, known to be a university professor (minor premise) is, therefore, smart (the conclusion). A special category of evidence concerns other people’s opinions. In particular, if these are revered by an individual—hence constituting “epistemic authorities” for that person—their views may carry particular weight for her or him and occasionally override other types of evidence. This lends the epistemic process a distinctly social flavour and highlights the centrality of social reality concerns (Hardin & Higgins, 1996) to human epistemic endeavours.

Terminating the epistemic sequence

It is generally agreed among philosophers of knowledge that the sequence of hypothesis generation and testing (whether in science or in common sense) has no unique or objective point of termination. In principle, one could continue constructing further and further hypotheses and proceed to test them interminably without ever crystallising firm knowledge on any topic. Of course, such epistemic “obsession” would be highly dysfunctional and paralysing. Indeed, most of the time people are quite capable of forming judgements based on available evidence and of self-regulating adaptively on the basis of those judgements. An important mechanism allowing this to happen has to do with a motivational variable referred to as the need for cognitive closure (Kruglanski, 2004). Two types of the need for closure have been distinguished, referred to respectively as the needs for nonspecific and specific closure.

¹For Popper (1959) the process of hypothesis testing is represented by the premise If H then E, which implies that one can only falsify a hypothesis via a logical modus tollens (if E is false then we can conclude that H must be false), but not verify it as we are suggesting. According to our analysis, however, the knower may depart from the assumption that *if and only if* hypothesis H were true evidence E would be observed. The *if and only if* framing implies that not only if H then E is true, but also if E then H is true. This way one could logically derive the hypothesis from the evidence in a modus ponens fashion, whereby E (the evidence is observed) therefore H (the hypothesis is supported). Of course, the *if and only if* assumption may need to be modified on the basis of subsequent information which would cast doubt on the originally derived conclusion that H was proven or supported. For instance, if an alternative hypothesis H₁ were posed and the need to distinguish it from the original H arose, one would formulate an inference rule whereby *if and only if* H but not H₁ were true then E₁ would obtain, etc.

The need for nonspecific closure denotes a desire for a firm answer to a question; any firm answer as compared to confusion and ambiguity. The need for a specific closure denotes a specific, desirable, answer to a question, e.g., an esteem-enhancing answer, an optimistic answer, and so on. Each of these needs is assumed to vary in degree and to lie on a continuum ranging from a low to a high motivational magnitude. Thus, one may desire nonspecific closure strongly, mildly, or not at all, actually craving to avoid it. Similarly, one may desire to reach a particular conclusion (or specific closure) with varying degrees of strength. Finally, both types of need determine the length of the epistemic sequence of hypothesis generation and testing. The higher the need for nonspecific closure the shorter the sequence and the stronger the tendency to “seize and freeze” on accessible, closure-affording, evidence. The higher the need for a specific closure, the stronger the tendency to terminate the sequence when the available evidence appears to yield the desired conclusion, or to keep the sequence going until such conclusion seems implied by the evidence.

EXPLORATIONS IN LAY EPISTEMICS

Over the last three decades, research in the lay epistemic framework has taken place within three separate paradigms, centred respectively on (1) the *need for cognitive closure*, (2) the *unimodel* of social judgement, and (3) the concept of *epistemic authority*. We describe these in turn and show how they interface in addressing functionally interdependent facets of human epistemic behaviour.

Need for closure research: The “why” of epistemic behaviour

The intrapersonal level

The most extensive research programme to date inspired by the lay epistemic framework concerned the need for nonspecific cognitive closure. It addresses the underlying motivation of knowledge formation, addressing the “why” aspect of human epistemics. The magnitude of the need for closure was assumed to be determined by the perceived benefits of closure, and by the costs of lacking closure. For instance, the need for closure was assumed to be elevated where action was required because the launching of intelligible action requires prior closure. Additionally, the need for closure was assumed to be elevated in circumstances where the possession of closure would obviate costly or laborious information processing, as may occur under time pressure, in the presence of ambient noise, or when a person is fatigued or intoxicated (see Kruglanski, 2004, for a review). When the need for closure is elevated, the absence of closure is aversive and stressful.

In a recent pair of studies Roets and van Hiel (2008) found that in a decision-making context (i.e., where closure was required) high (but not low) NFCC scoring individuals had increased systolic blood pressure and heart rate as well as a rise in self-reported feelings of distress (Study 1). Moreover, as long as no conclusive solution was obtained, high (but not low) NFCC individuals showed a progressive increase of arousal assessed via a galvanic skin response. In addition to the transient situational determinants of the need for closure, this motivation was also assumed to represent a dimension of individual differences and a scale was constructed to assess it (Webster & Kruglanski, 1994). By now this scale has been translated into numerous languages and has been shown to converge in its results with situational manipulations of the need for closure;² an improved version of the scale was recently published by Roets and van Hiel (2007). These results pertained to phenomena on intrapersonal, interpersonal, group, and intergroup levels of analysis. In the present chapter we address them briefly. More extensive recent reviews are given in Kruglanski and Webster (1996), Kruglanski (2004), and in Kruglanski, Pierro, Mannetti, and DeGrada (2006c).

Seizing and freezing phenomena. As noted earlier, a heightened need for cognitive closure induces in individuals the tendency to “seize” on early, closure-affording evidence and “freeze” on the judgements (beliefs) it suggests. These tendencies were studied in reference to several classic phenomena in social cognition and perception.

For instance, Kruglanski and Freund (1983) presented participants with information about a target person’s past behaviours in a work context. Participants were then asked to make a judgement about how successful the target would be at a new job. The information about the target included both positive and negative information, with the order of this information varied such that some participants saw the negative information first while others saw the positive information first. Need for closure was manipulated via time pressure by giving some participants a 3-minute limit to make their judgements (after listening to the information), with a stopwatch in sight reminding them of the time constraint. In the low time pressure condition, participants were told they would have an unlimited time to complete the judgements.

It was predicted that need for closure would exert a stronger primacy effect when participants were in a high (vs low) accountability conditions. To manipulate accountability, some participants were told that they would have

²In a recent paper, Roets, van Hiel, Cornelis, and Soetens (2008) argued that in addition to exerting a direct motivational effect similar to that of dispositional NFCC, situational manipulations of need for closure (via time pressure or noise) exert an effect on cognitive capacity as well manifesting in deteriorated task performance.

to explain their predictions to others and that their judgement would be compared to objective standards. In the low accountability condition participants were told that they would not be able to find out how other people judged the target or how the target actually performed at the new job.

As predicted, participants' judgements of the target person were based more on the early appearing information when under time pressure (vs no time pressure). As shown in Figure 1, the difference between the high as compared to the low time pressure conditions was significantly greater when accountability was high (vs low). These results demonstrate the ability of need for closure to induce the tendency to "seize" and freeze" on early information. The primacy effect of need for closure was subsequently replicated in a number of further studies, (Ford & Kruglanski, 1995; Freund, Kruglanski, & Shpitzazjen, 1985; Richter & Kruglanski, 1998; Webster, Richter, & Kruglanski, 1996).

- ① In an intriguing demonstration of need for closure's impact on the use of contextually activated information, Pierro and Kruglanski (in press) conducted a study on the influence of need for closure on the *transference effect* in social judgement. The Freudian concept of transference refers to the process by which a psychotherapeutic patient superimposes onto the therapist her or his childhood fantasies with regard to a significant childhood figure (typically a parent). However, Andersen and her colleagues (e.g., Anderson & Cole, 1990, Andersen, Glassman, Chen, & Cole, 1995) showed that the transference effect could be part and parcel of normal sociocognitive functioning in which a significant other's schema is mistakenly applied to a new target that resembles the significant other in some respects.
- ① In a first session of Pierro and Kruglanski's (in press) experiment participants completed the revised 14-item need for closure scale (Pierro & Kruglanski, 2005) and were asked to visualise and describe a

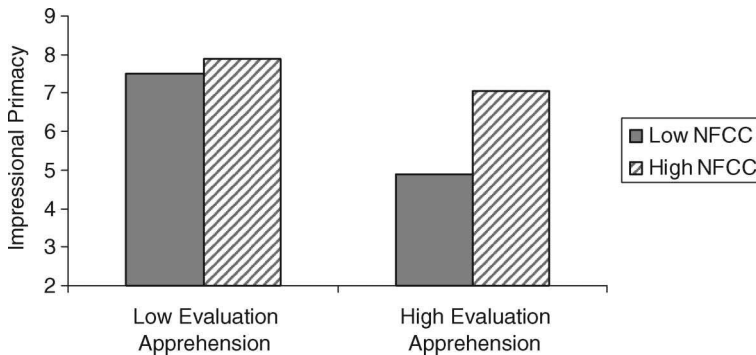


Figure 1. The effect of need for closure (NFCC, operationalised in this study via time pressure) and evaluation apprehension on impression primacy (Kruglanski & Freund, 1983).

significant other. In a second session participants were presented with information about a target person with whom they expected to interact. The target person was either described in similar terms as their significant other, or was depicted as dissimilar from that person. After having studied this information, participants were presented with a recognition test of their memory for the target. Items about the target person that were not presented in the description were included in the recognition test. The degree of transference was operationally defined as the proportion of statements falsely recognised as having been included in the description of the target person that were consistent with the representation of the significant other provided in the first session. As shown in Figure 2, the results indicated that participants high on the need for closure exhibited a more pronounced transference effect, as indicated by higher false alarm rates, in the similar (vs dissimilar) condition than did participants low on the need for closure.

Other studies found evidence that need for closure, whether induced situationally or measured via a trait scale, augments the effects of prevalent stereotypes on judgements about persons (Dijksterhuis, Van Knippenberg, Kruglanski, & Schaper, 1996; Jamieson & Zanna, 1989; Kruglanski & Freund, 1983). A stereotype represents a knowledge structure affording quick judgements about members of a stereotyped “category.” That need for closure augments the tendency to utilise stereotype-based evidence in impression formation therefore supports the notion that this need induces the “seizing” and freezing” tendencies assumed by the lay epistemic theory.

The interpersonal level

Beyond its effects on intrapersonal phenomena in the domain of social judgement, need for closure was shown to exert a variety of interpersonal

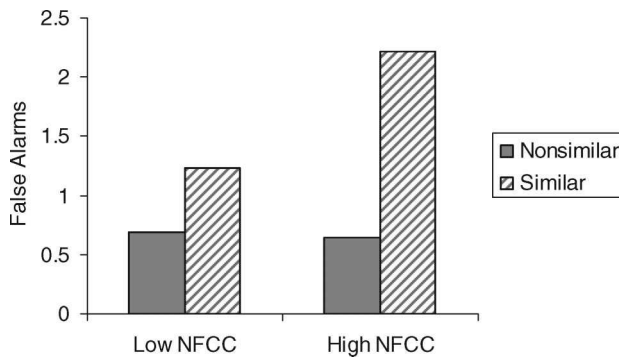


Figure 2. The effect of target similarity and need for closure (NFCC) on false alarm rate (Pierro & Kruglanski, in press).

phenomena in realms of linguistic expression, communication and persuasion, empathy, and negotiation behaviour.

Linguistic expression. Several studies looked at need for closure effects on language abstractness in interpersonal communications. Abstract language indicates a *permanence* of judgements across situations, and hence a greater stability of closure. For instance, characterising an individual's behaviour in a given situation as reflecting this person's aggressiveness (an abstract depiction) implies that he or she may be expected to behave aggressively in other contexts as well. By contrast, depicting the same behaviour as a "push" (that is, concretely) carries fewer trans-situational implications. Accordingly, it is possible to predict that individuals under high (vs low) need for closure would generally tend to employ abstract terms in their communications. Consistent with this prediction, Boudreau, Baron, and Oliver (1992) found that participants, when communicating their impressions to a knowledgeable and potentially critical other (assumed to induce a fear of invalidity and lower the need for closure), tended less to describe a target in abstract trait terms than did participants communicating their impressions to a recipient assumed to have little knowledge on the communication topic.

Using Semin and Fiedler's (1991) linguistic category paradigm, Rubini and Kruglanski (1997) found that participants under high (vs low) need for closure (manipulated via noise *or* measured via the need for closure scale) tended to frame their questions in more abstract terms, inviting reciprocal abstractness from the respondents. That, in turn, contributed to the creation of greater interpersonal distance between the interlocutors, lessening their liking for each other. Webster, Kruglanski, and Pattison (1997) explored need for closure effects on the "linguistic intergroup bias (LIB)". The LIB reflects the tendency to describe negative ingroup behaviours in concrete terms and positive outgroup behaviours in concrete terms (suggesting their specificity), and to describe positive ingroup behaviours and negative outgroup behaviours in abstract terms (suggesting their generality). Consider how need for closure may impact these phenomena. On the one hand, need for closure should induce a general tendency towards abstraction because of the desire of high need for closure individuals for stable knowledge that transcends the specific situation. However, abstract judgements about positive outgroup and negative ingroup behaviours should run counter to the tendency for individuals with high need for closure to display ingroup favouritism (in so far as the in group is typically the provider of stable knowledge). These two tendencies work *in concert* as far as judgement of positive ingroup and negative outgroup behaviours are concerned, and are *in conflict* (hence possibly cancelling each other out) as far as negative ingroup and positive outgroup behaviours are concerned.

As shown in Figure 3, Webster et al. (1997) found that high (vs low) need for closure participants exposed to positive ingroup or negative outgroup behaviours described such behaviours more abstractly. However, high and low need for closure participants did not differ on the abstractness of their descriptions of negative ingroup or positive outgroup behaviours.

Persuasion. Research by Kruglanski, Webster, and Klem (1993) explored the conditions under which need for closure may increase or decrease the susceptibility to persuasion. To do this, participants were presented with information about a legal case, and allowed time to process the information and then to talk with a partner (fellow “juror”) in order to reach a verdict in the case. When participants were given complete information about the case, including legal analysis suggesting the appropriate verdict, individuals high (vs low) on the need for closure were less likely to be persuaded by their fellow juror (who argued for the opposite verdict). However, when high need for closure individuals were given incomplete information lacking the legal analysis, they were more likely to be persuaded by their fellow juror than their low need for closure counterparts. In short, individuals high (vs low) on the need for closure tend to resist persuasion attempts when they have formed a crystallised opinion about a topic, but tend to change their attitudes when presented with persuasive appeals when they lack an opinion about the topic.

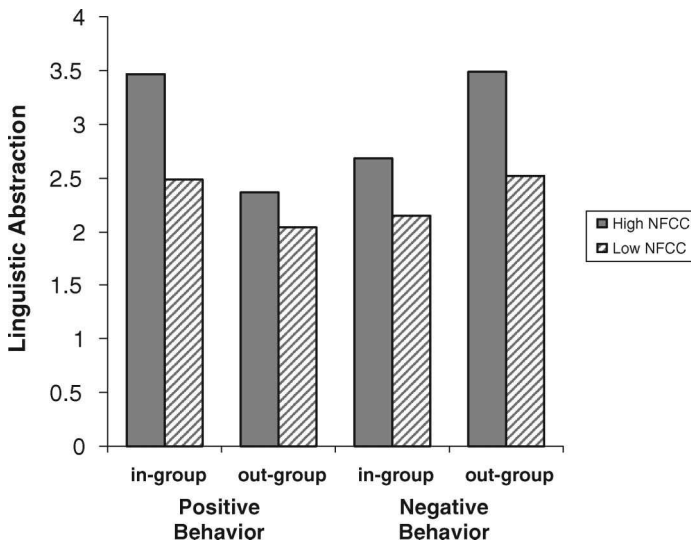


Figure 3. The effect of need for closure (NFCC), ingroup versus outgroup status, and type of behaviour on abstractness of description (Webster et al., 1997).

Empathy. Webster-Nelson, Klein and Irvin (2003) found that, because high need for closure individuals' tend to "freeze" on their own perspective, they are less able to empathise with their interaction partners, especially when those are dissimilar from themselves. In their study the need for closure was manipulated via an induction of mental fatigue. Using a dispositional measure of the need for closure, Schteynberg, Gelfand, Imai, Mayer, and Bell (2008) found that high (vs low) scorers were less sensitive to injustice done to their team-mate by the experimenter (perceived the experimenter as less unfair). In a referential task paradigm, Richter and Kruglanski (1999) found that individuals with high (vs low) dispositional need for closure tended less to implement an effective "audience design". They tended less to "tune" their messages to their interlocutors' unique attributes; as a consequence their communications were less effectively decoded by their recipients.

Negotiation behaviour. To test the effect of need for closure in the domain of negotiation behaviour, DeDreu, Koole, and Oldersma (1999) measured participants' dispositional need for closure and then (after a 30-minute delay) had them engage in a task in which they operated as sellers and interacted with presumed buyers (actually simulated by computer-programmed responses). The participant's (seller's) task was to negotiate the terms of the sale, including delivery time, price, and form of payment. Each of these was associated with rewards for the participant in the form of chances in a lottery such that greater profit for the seller was associated with higher chances of winning. Participants engaged in six rounds of negotiations, beginning with the buyer. The buyers' responses were pre-programmed to remain at a moderate level, while conceding slightly at each round. To manipulate the focal point to which participants might adjust their negotiations, they were either told that previous participants had received 11,000 points (high focal point), 3000 points (low focal point), or simply that the range of possible points was from 0 to 14,000 points (no focal point).

Three dependent measures were assessed. First, prior to the start of the negotiations participants were asked to indicate the minimum amount they would be willing to accept in the negotiation. Second, participants' concessions in the task were determined by the decrease in the amount of points participants demanded from the first to the last rounds of negotiation (with greater numbers indicating a larger concession). After the six trials (in which most participants did not reach an agreement), participants completed a self-report measure of the extent to which they thought systematically during the task.

As shown in Figure 4, individuals with high (vs low) dispositional need for closure tended more to adhere to anchor values. That is, they determined

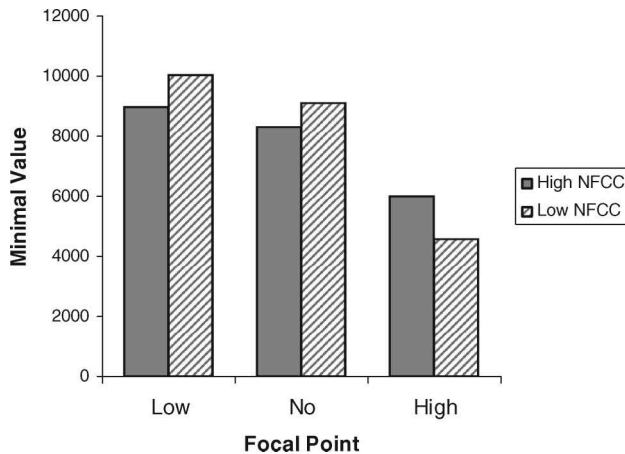


Figure 4. The effect of need for closure (NFCC) and focal point on the minimal value found acceptable in a negotiation (de Dreu et al., 1999).

the minimal profits they themselves would accept according to the alleged profits attained by others in the task. When no focal point was provided, high versus low need for closure participants did not differ in the minimal value they expressed the willingness to accept. In addition, high (vs low) need for closure participants made smaller concessions to their negotiation partners and engaged in less systematic information processing.

In another study on negotiation, De Dreu and Koole (1997) lowered participants' need for closure via accountability instructions (Tetlock, 1992) or by increasing the costs of invalid judgements (Kruglanski & Freund, 1983). These manipulations lowered participants' tendency to use the "*consensus implies correctness*" heuristic, as well as their tendency to behave competitively and to reach an impasse when a majority suggested a competitive strategy.

The foregoing findings exemplify need for closure effects on a variety of intrapersonal and interpersonal variables (for an extensive review see Kruglanski, 2004). Extensive research also examined the effects of the closure motivation on groups, resulting in a phenomenon of *group centrism* described next.

Group centrism. Some people are more group oriented than others, and most people are more group oriented in some situations than in other situations. Kruglanski et al. (2006c) defined the concept of "group centrism" by the degree to which individuals strive to enhance the "groupness" of their collectivity. Groupness, in turn, has been defined by a firm, consensually supported, "shared reality" (Hardin & Higgins, 1996) unperturbed by

dissents and disagreements. While reality sharing has been regarded as the defining essence of groupness (e.g., Bar-Tal, 1990, 2000), its attainment may be facilitated by several aspects of group interaction enhanced by the need for closure. At the initial phases of group formation, this can involve members' attempts to arrive at a speedy consensus, by exerting uniformity pressures on each other (DeGrada, Kruglanski, Mannetti, & Pierro, 1999).

To further test the influence of need for closure on the group decision-making process, Pierro, Mannetti, DeGrada, Livi, and Kruglanski (2003) engaged participants in a group task 2 months after participants' need for closure had been assessed. Participants were divided into groups based on their need for closure scores, with some groups containing high need for closure individuals and others individuals low on need for closure. Each group was composed of four individuals, each role-playing a manager in a corporation. The group's goal was to determine which of the company's employees should be given a cash award for their work performance. Each "manager" represented a candidate nominated by this "manager's" department. The dependent measures included the asymmetry of speaking time (seizing and holding the floor), perceptions of each participant's influence over the group, and each member's style assessed on the *laissez faire/autocratic* dimension.

The results indicated that groups composed of high (but not of low) need for closure members displayed the emergence of an autocratic group structure wherein influence emanates from a centralised authority, enhancing the likelihood of commonly shared opinions. As shown in Figure 5, in groups composed of high need for closure persons, some members more than others disproportionately controlled the group discussion by "seizing" the discussion floor and continuing to talk when others attempted to interrupt. Furthermore, in high (but not low) need for closure groups, members' level of autocratic style (as assessed by independent judges) was positively correlated with their control of the discussion floor. Finally, individuals' floor control was positively correlated with their influence on the group (as indexed by self-report and by assessment of independent observers). This research supports the notion that groups composed of high need for closure members are more likely to form autocratic structures, in which a single person or a restricted number of individuals serve as foci of influence, that shape the groups' commonly shared realities.

The laboratory findings just described are consistent with Gelfand's (2008) cross-cultural research carried out in 35 countries across the globe in which she finds a significant relationship between the country's degree of autocracy and situational constraint, in turn related to inhabitants' need for closure. Although these results may reflect the notion that high need for closure individuals tend to construct autocratic societies, they may also mean that life in tight, autocratic, societies tends to engender members with

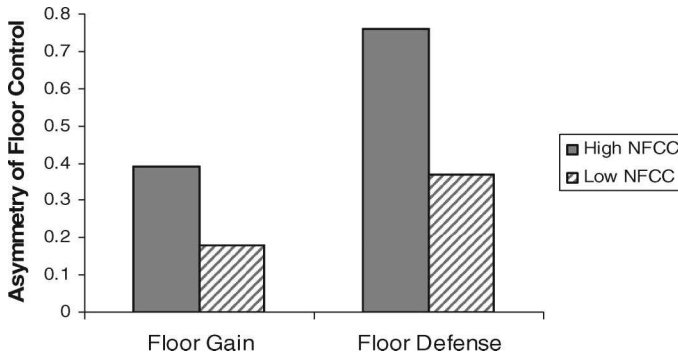


Figure 5. The effect of need for closure (NFCC) on asymmetry of floor control during group decision making (Pierro et al., 2003).

a high need for closure. These two possible tendencies are not necessarily incompatible. Their existence and interrelation could be profitably probed in further research.

In addition to influencing group structure, intensified quest for uniformity under heightened need for closure tends to lead to an intolerance of diversity (Kruglanski, Shah, Pierro, & Mannetti, 2002; Shah, Kruglanski, & Thompson, 1998). Diversity is a feature that may impede the arrival at consensus, thereby reducing the group's ability to reach closure. In this vein, heightened need for closure, through the implementation of time pressure and ambient noise, has been shown to lead to a rejection of opinion deviates in a working group (Kruglanski & Webster, 1991). Elevated need for closure was also found to foster favouritism towards one's ingroup, in direct proportion to its degree of homogeneity and opinion uniformity. Finally, need for closure was found to foster outgroup derogation (Kruglanski et al., 2002; Shah et al., 1998), which degree was *inversely* related to the outgroup's homogeneity and opinion uniformity (Kruglanski et al., 2002). These findings are consistent with the notion that high need for closure individuals are attracted to groups (whether ingroups or outgroups) that promise to offer firm shared realities to their members, affording stable cognitive closure.

The quest for stable shared reality on part of individuals with high need for closure should express itself in conservatism and the upholding of group norms and traditions. Indeed, both political conservatism (Jost, Glaser, Kruglanski, & Sulloway, 2003a, 2003b) and the tendency to maintain stable group norms across generational cycles (Livi, 2003) were found to be related to a heightened need for closure. Chirumbolo (2002), and Van Hiel, Pandelaere, and Duriez (2004) found that the relation between need for closure and conservatism was mediated by general political attitudes, notably Right Wing Authoritarianism, and Social Dominance Orientation.

Roets and van Hiel (2006) found additionally that these relationships reflected both the “freezing” and the “seizing” tendencies induced by the NFCC, the latter being specifically assessed via the Decisiveness facet of the NFCC scale. Chirumbolo and Leone (2008) also found in two election studies (the 2004 European elections and the 2005 Italian Regional elections) that need for closure was linearly (and positively) related to voting along the left right continuum. Finally, Chirumbolo, Areni, and Sensales (2004) found that Italian students high (vs low) on the need for closure were more nationalistic, religious, exhibited a preference for right-wing political parties, reported anti-immigrant attitudes, scored lower on pluralism and multiculturalism, and preferred autocratic leadership and a centralised form of political power.

Kosic, Kruglanski, Pierro, and Mannetti (2004) found evidence that need for closure augments loyalty to one’s ingroup and instils a reluctance to abandon it and “defect” to alternative collectivities. Such loyalty persists to the extent that one’s ingroup is salient in the individuals’ social environment. If, however, an alternative group’s views became overridingly salient, high need for closure may in fact prompt members to switch groups. In this vein, Croat and Polish immigrants to Italy who were high (vs low) on need for closure tended to assimilate less to the Italian culture (i.e., they maintained loyalty to their culture of origin) if their social environment at entry consisted of their co-ethnics. However, if it consisted of members of the host culture (i.e., of Italians), high (vs low) need for closure immigrants tended more to “defect” and assimilate to the Italian culture.

Need for closure may also influence the attitudes of members of existing groups towards potential newcomers into their midst. We have already reported Chirumbolo et al.’s (2004) finding as to the anti-immigration attitudes of high (vs low) need for closure Italians. More recently, Dechesne, Schultz, Kruglanski, Orehek, and Fishman (2008) investigated whether individuals high on the need for closure would prefer groups with impermeable (vs permeable) boundaries. Dutch undergraduate students first completed the need for closure scale, and subsequently read a news article highlighting either the permeability or the impermeability of their college’s boundaries. Participants in the impermeable condition read a passage stating that “the choice of one’s university is virtually irreversible” whereas participants in the permeable condition read a passage depicting the choice of one’s university as reversible. As shown in Figure 6, participants high (vs low) on the need for closure expressed greater identification with impermeable (vs) permeable group boundaries that do not allow much traffic in and out of the group. The same pattern of results was found for liking of the group. Dechesne et al. (2008) also found that American students with high (vs low) need for closure had more negative attitudes toward immigration into the US.

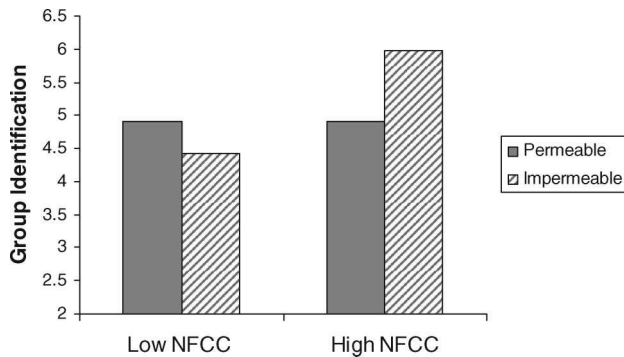


Figure 6. The effect of group permeability and need for closure (NFCC) on ingroup identification (Dechesne et al., 2008).

Conclusions. In summary, a great deal of research attests to the considerable role that the need for cognitive closure plays in intrapersonal, interpersonal, and group phenomena. Basically these have to do with the importance of knowledge construction processes in human affairs: At the individual level these processes affect the formation of social judgements, attitudes, and impressions. At the interpersonal level they enter into communication and persuasion, empathy, and negotiation behaviour, and at the group level into the formation of consensus and the forging of stable social realities for the members. In all these domains, and on all these levels of analysis, the need for closure has been shown to constitute a variable with implications for major classes of social psychological phenomena.

Essentially, the need for closure paradigm addresses the *motivational* underpinnings of knowledge formation, the “why” of epistemic behaviour, affecting the extent of information processing en route to a judgement, and the tendency to “seize and freeze” on judgement affording information. By contrast, the unimodel paradigm considered next “zooms in” on the *informational* aspect of the epistemic process and investigates the “how” of the epistemic process, illuminating the way in which given information exerts impact on individuals’ judgements (Erb et al., 2003; Kruglanski & Thompson, 1999a, 1999b; Kruglanski et al., 2006b, 2007).

The unimodel of human judgement: The “how” of epistemic behaviour

The function of rule following in lay epistemics

A basic aspect of the lay epistemic theory concerns the role of evidence in knowledge formation. As noted earlier, the lay epistemic theory assumes

that all knowledge derives from evidence, broadly conceived. In other words, to construct new knowledge, or to form a new judgement the individual is assumed to use an inference rule of an “if . . . then” type, whereby if a given evidence E obtains, the conclusion C follows (or the hypothesis H is supported).

Although the foregoing depiction of inference as a case of syllogistic reasoning may seem deliberative, conscious, and explicit, it need be none of these. An identical mechanism may underlie processes typically considered as associative or “mechanistic”. Consider the phenomenon of classical conditioning. Although it has been viewed as prototypic of associative learning, compelling evidence exists (Holyoak, Koh, & Nisbett, 1989; Rescorla, 1985; Rescorla & Holland, 1982; Rescorla & Wagner, 1972) that it is fundamentally rule based.

Thus, based on an extensive review of pertinent conditioning studies, Holyoak and colleagues (1989, p. 320) concluded that:

representations of the environment take the form of . . . [if then] rules that compose mental models . . . the rat’s knowledge about the relation between tones and shocks might be informally represented by a rule such as “if a tone sounds in the chamber then a shock will occur, so stop other activities and crouch.”

From this perspective (Holyoak et al., 1989, p. 320):

Rules drive the system’s behaviour by means of a recognize–act cycle. On each cycle the conditions of rules are matched against representations of active declarative information, which we . . . term *messages*; rules with conditions that are satisfied by current messages become candidates for execution. For example, if a message representing the recent occurrence of a tone is active, the conditions of the above rule will be matched and the actions it specifies may be taken.

Note the affinity of this conception to the basic syllogistic sequence: The “rule” assumed by Holyoak and colleagues (1989) is analogous to the major premise, and the “message” that “matches the rule” is analogous to the minor premise, i.e., instantiation of the antecedent term in the major premise, warranting the inference of the consequent term.

Whereas the work reviewed by Holyoak et al. (1989) concerned the phenomena of classical conditioning, a recent integration of evaluative conditioning phenomena attests that it too is “propositional”; that is, rule-following (Mitchell, De Houwer, & Lovibond, in press). In evaluative conditioning a neutral CS (e.g., a book) is presented concomitantly with an affectively laden UCS (e.g., a smiling, or a pouting face); subsequently, it is found that the CS acquired the affective valence of the UCS. Although evaluative conditioning differs in a number of important respect from classical conditioning (Baeyens, Crombez, Van den Bergh, & Eelen, 1988; Walther, Nagengast, & Trasselli, 2005) the rule following nature of the

conditioning process appears common to both. As Mitchell et al. (in press) put it in reference to evaluative conditioning "... associative learning results, ... in humans ... not from the automatic formation of links, but from the operation of controlled reasoning processes" (p. 6) in which "The process of reasoning about the relationship between events produces ... declarative, propositional knowledge about those events ..." (p. 14), hence "[conditional, if-then] ... links that specify how the two events are related" (p. 15, parentheses added).

It is noteworthy that the rules involved in conditioning may be applied in given informational contexts with considerable ease and alacrity. The notion that "automatic" phenomena in the domain of (motor or cognitive) skill acquisition involve a routinisation of "if ... then" sequences has been central to Anderson's (1983) ACT* model that Smith (1984, 1989; Smith & Branscombe, 1988; Smith, Branscombe, & Bormann, 1988) extended to the realm of social judgement. That research has demonstrated that social judgements represent a special case of procedural learning based on practice that strengthens the "if ... then" components resulting in increased efficiency (or "automaticity").

Awareness

Efficiency implies, in turn, a lowered need to commit attentional resources to the carrying out of social judgements. In William James' (1890, p. 496) felicitous phrasing "consciousness deserts all processes when it can no longer be of use". According to his parsimony principle of consciousness, routinisation removes the need for conscious control of the process, rendering awareness of the process superfluous. In a related vein, Logan (1992) suggested that automatization of certain skills effects a shift of attention to higher organisational levels.

It is in this sense, then, that some judgemental phenomena, mediated by well-routinised "if ... then" rules, may take place outside conscious awareness. Helmholtz (1910/2000) discussed the notion of unconscious *inference* in the realm of perception. More recently, social cognitive work on spontaneous trait inferences (Newman & Uleman, 1989; Uleman, 1987) suggests that lawful (i.e., rule-following) inferences presumably can occur without explicit inferential intentions, and without conscious awareness of making an inference. "The spontaneous trait inference that John is 'clumsy' on basis of the information that he stepped on Stephanie's foot while dancing" (Newman & Uleman, 1989, p. 156), surely requires the inference rule "if stepping on a dancing partner's foot, then clumsy" or some variant thereof: A person who did not subscribe to that premise would be unlikely to reach that particular conclusion.

Unconscious inferences are also exemplified by Schwarz and Clore's (1996) "feelings as information" model. A mood state may be mistakenly

attributed to a given cause. For instance, a positive mood engendered by pleasant weather may be treated as a basis for an inference of a general life satisfaction (Schwarz & Clore, 1983, Schwarz, Servay, & Kumpf, 1985) based on an “if ... then” rule linking one’s feeling state with general satisfaction. As Schwarz and Clore (1996, p. 437) summarised it “... reliance on ... experiences [for various inferences] generally does not involve conscious attribution”.

Thus a variety of evidence and theoretical considerations converge on the notion that judgements (whether assessed directly or through their behavioural manifestations) are rule based and, in this sense, derived from “evidence”. To make a judgement is to go beyond the “information given” (Bartlett, 1932; Bruner, 1973), by using it as testimony for a conclusion in accordance with an “if ... then” statement to which the individual subscribes. Such implicational structure appears to characterise explicit human inferences (Anderson, 1983), implicit conclusion drawing (Schwarz & Clore, 1996), conditioning responses in animal learning studies (Holyoak et al., 1989; Rescorla & Wagner, 1972), and perceptual judgements of everyday objects (Gregory, 1997; Pizlo, 2001; Rock, 1983). The elementary “if ... then” form appears essential to all such inferences, whether conscious or nonconscious, instantaneous or delayed, innate or learned. It is a fundamental building block from which all epistemic edifices are constructed.³

In describing the knowledge (or judgement) formation process as syllogistic, we do not mean to suggest that individuals necessarily engage in explicit syllogistic reasoning (e.g., Newell & Simon, 1972). Nor do we mean to imply that individuals are familiar with the intricacies of formal logic—a proposition belied by over 30 years of work on the Wason (1966) problem among others. For instance, people might incorrectly treat an *implicational* “If A then B” relation as an *equivalence* relation, “Only if A

³That the general implicational IF-THEN structure represents the gist of inference is a mainstay of most major depictions of this process in the philosophy of science and of knowledge literatures. Consider the venerated Hempel–Openheim (1948) scheme of scientific explanation, known as the deductive nomological (D-N) framework. According to this model, a scientific explanation contains two major elements: an *explanandum*, a sentence “describing the phenomenon to be explained” and an *explanans*, “the class of sentences that account for the phenomenon” (Hempel & Oppenheim, 1948, reprinted in Hempel, 1965, p. 247). For the explanans to successfully explain the explanandum, “the explanandum must be a logical consequence of the explanans” and “the sentences constituting the explanans must be true”. (Hempel, 1965, p. 248). That is, any proper explanation takes the form of a sound deductive argument in which the explanandum follows as a conclusion from the premises in the explanans. For instance, the sentence “All gases expand when heated under constant pressure”, or “If something is a gas, then it expands when heated under constant pressure”, constitutes a major premise that in conjunction with the appropriate minor premise—that is, information that “some particular substance is a gas that has been heated under constant pressure”—affords the inference that this substance will expand, or an explanation of why it did expand.

then B”, suggesting that also “if B then A” (which was not originally intended). We also accept that often people may be better able to recognise the “correct” implicational properties of concrete statements in familiar domains rather than those of abstract, unfamiliar statements (Evans, 1989). None of it is inconsistent with the notion that persons generally reason from subjectively relevant rules of implicational “if ... then” format (see also Abelson, 1968; Mischel & Shoda, 1995).

Parametric determinants of informational impact

Given the syllogistic structure of knowledge formation from evidence to conclusion, it is possible now to analyse the conditions under which the information given in a specific context would affect the individual’s judgements. As noted earlier, a syllogism includes a major premise and a minor premise that jointly yield a conclusion. In this sense, the “information given” is the minor premise, which affirms the antecedent condition of a pre-existing inference rule serving as a major premise and mediating the road from evidence to conclusion. Accordingly, in order that a given piece of information exerted judgemental impact the individual should subscribe to the major premise linking a given antecedent condition and a given consequent in an “if X then Y” fashion. Subscribing to an inference rule is a matter of degree reflecting the strength of belief in the conditional association linking a given X with a given Y. The continuum of belief strength defines the *parameter of subjective relevance* of information X to conclusion Y.

However, a general subscription to an inference rule merely defines an *availability* of such rule in a person’s memory (Higgins, 1996). In addition, the rule needs to be momentarily *accessible* to a person, or to be activated from memory. In turn, rule activation may be more or less difficult depending on its prior history of activation, i.e., its frequency and recency of activation (Higgins, 1996). The difficulty issue also arises in reference to an individual’s ability to recognise that a given, situationally present, piece of information *matches* an inference rule and in this sense constitutes a minor premise that jointly with a major premise is capable of yielding a conclusion. Specifically, the information may be less or more salient in a given context, constituting a weaker or stronger signal against the background of irrelevant noise. In addition, the information may be presented in a more or less lengthy format and to be less or more difficult to decipher. All these may determine the difficulty of recognising that the information given is relevant to a requisite judgement, or represents a minor premise in the appropriate syllogism. The *difficulty of the inference task* (including the activation of the major premise from memory, and recognition that the information given represents the minor premise), defines another parameter that affects the degree to which the information given would impact the judgement

rendered. Specifically, the greater the difficulty of the inference task, the greater should be the amount of *cognitive* and *motivational* resources needed to perform it.

As the foregoing discussion suggests, it is useful to distinguish conceptually between *potential relevance* of X to Y reflecting the degree to which the “If X then Y” inferential rule has been generally learned and believed in, and *contextual* or *perceived relevance* reflecting the degree to which X is recognised as relevant to Y in a given situation. Beyond degree of belief, perceived relevance is affected by accessibility of the rule, difficulty of identifying the X and individual’s motivational and cognitive resources available for overcoming the difficulty.

Resource availability as a determinant of informational impact. The relationship between the availability of processing resources and the ability to handle demanding inferential tasks has implications for the kinds of information that would affect judgements in different circumstances: Under conditions of limited processing resources, the easier-to-process information is likely to be utilised and to affect judgements to a greater extent than the difficult-to-process information. However, under conditions of ample processing resources, the difficult-to-process information would be utilised more *if* it appears to be more relevant to the judgemental task than the easy-to-process information. The foregoing assumptions afforded a reconceptualisation of considerable body of research findings formerly interpreted from a dual mode perspective on social judgement (see Chaiken & Trope, 1999).

It is important to disavow here any implication that the presence or absence of cognitive resources is systematically related to the quality of cognitive inference performance. Thus we assume that highly routinised and accessible rules (major premises) can be processed with minimal resources when matched with the appropriate situational information (minor premises). Furthermore, we intend no implication that the presence of resources would lead individuals to rely on objectively “better” rules or even on subjectively “better” (more relevant) rules. All we are asserting is that, in the absence of resources, individuals would rely more on easy-to-process information, whereas in the presence of ample resources they would also entertain the use of more difficult information. These notions are illustrated in research reviewed below.

Persuasion research. A pervasive finding in persuasion research has been that “peripheral” or “heuristic” cues exert judgemental impact (i.e., effect change in recipients’ attitudes or opinions) under conditions of low processing resources (e.g., where recipients’ interest in the task is low, when they are cognitively busy or distracted, when their need for cognition is low, etc.). By contrast, “message arguments” typically exerted their effects under

high processing resources (e.g., high interest in the task, or ample cognitive capacity). However, in reviews of these studies (Erb et al., 2003; Kruglanski, Pierro, Mannetti, Erb, & Chun, 2007; Kruglanski & Thompson, 1999a, 1999b; Kruglanski, Thompson, & Spiegel, 1999; Pierro, Mannetti, Erb, Spiegel, & Kruglanski, 2005) it became apparent that often in persuasion research the type of the information (i.e., “peripheral” or “heuristic” cues versus message arguments) was confounded with task demands. Because the message arguments were typically lengthier, more complex, and placed later in the informational sequence, their processing may have imposed higher processing demands than the processing of “cues” that were invariably brief, simple, and presented upfront. When these confoundings were experimentally removed, the previously found differences between conditions under which the “cues” versus the “message arguments” (or vice versa) exerted their persuasive effects were eliminated (Erb et al., 2003; Kruglanski et al., 2007; Kruglanski & Thompson, 1999a; Pierro et al., 2005).

One of the most important contributions of the dual-process models was the finding that when persuasion occurred as the result of “central” or “systematic” information processing, defined as *message or issue processing*, the resulting attitude change was more persistent over time and was more strongly related to subsequent behaviours. However this research always presented source information *briefly and upfront*, with message arguments coming later and being presented in a *lengthier and more complex* format. This research design led to the conclusion that persuasion as a result of “central” or “systematic” processing of message arguments led to greater attitude persistence and a stronger attitude–behaviour link. According to the unimodel framework, however, source information and message arguments serve the same role as evidence in forming judgements. Therefore any persuasion as a result of extensive processing of information, including source information, should lead to attitude persistence and behaviour consistent with the attitude.

To test this notion, Pierro, Mannetti, Orehek, and Kruglanski (2008) presented participants with either brief (50 words) or lengthy (full-page) source information. The source, an education consultant, was described as either expert (a full professor of cognitive psychology at a prestigious university specialising in curriculum development) or inexperienced (a professor at a low-prestige technical institute studying the psychology of tourism). Participants then read a passage written by the source arguing for the adoption of a new policy that would require participation in psychology experiments for students. Student participants were told either that this policy would be implemented soon (high involvement) or that it would be implemented following their graduation (low involvement). Immediately after reading the persuasive message, only when the source information was lengthy (but not brief) were participants in the high-involvement condition

more in favour of the policy when it was presented by an expert (vs inexpert) source. However, only when the source information was short (but not lengthy) were participants in the low-involvement condition more in favour of the policy when it was presented by an expert (vs inexpert) source. This result replicates prior findings by Kruglanski and colleagues (for recent review, see Kruglanski et al., 2007).

Despite the fact that the short source information did have immediate persuasive effect under low involvement, this effect did not persist as much as did the effect of lengthy source information under high involvement. Specifically, participants in the high involvement condition who received lengthy (vs short) source information displayed greater attitude persistence and intentions to participate in experiments 3 weeks later. Finally, Figure 7 shows that participants in the high-involvement condition and who received lengthy (vs brief) source information were more likely to engage in attitude-consistent behaviours by participating in an experiment they had been invited to attend in the expert (but not an inexpert) source condition. No such differences were found for participants in the low-involvement condition with an expert source, or the high-involvement condition with an inexpert source. This behaviour occurred a full month after participants had received the persuasive appeal, suggesting that attitude change as a result of extensively processed *source information* (often considered peripheral and heuristic) can result in persistent attitudes and a strong attitude-behaviour link.

The persistence of attitude change following extensive processing of source information suggests that it is the extent of information processing rather than the type of information (source vs message argument) that

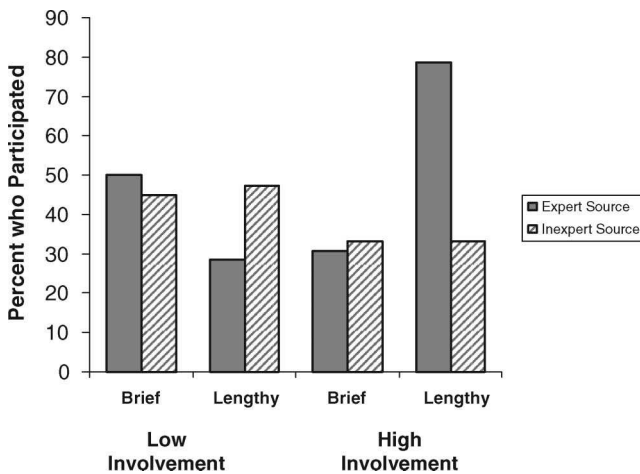


Figure 7. The effect of issue involvement, source expertise, and length of source information on participation behaviour (Pierro et al., 2008).

determines the stability of attitude change. Presumably, extensive processing of evidence warranting the adoption of a given attitude (i.e., source information or message argument) creates many linkages between the attitude concept and information stored in memory. These linkages may later facilitate retrieval of the attitude, rendering it readily activated and highly accessible, hence increasing its potential to guide behaviour (Fazio, 1990).

Dispositional attributions. A major question posed by attribution researchers concerned the process whereby a given behaviour performed by an actor is causally ascribed to the situational context, or to the actor's disposition. In this vein, Trope and Alfieri (1997) found that ambiguous behaviour tends to be disambiguated by assimilation to the context in which it is taking place. For instance, an ambiguous facial expression is likely to be perceived as sad if the context was sad as well (e.g., a funeral), and as happy if the context was happy (e.g., a party). However, once the behaviour had been identified, and the question of its causal origin was pondered, the context plays a subtractive (rather an assimilative) role in determining the behaviour's attribution. Specifically, the role of the context is subtracted to determine the role of the actor's disposition in producing the behaviour. For instance, if the context was sad, an individual's sad expression would not be attributed to the actor's dispositional sadness because other persons in the same situation would probably be sad as well.

Of present interest, Trope and Alfieri (1997) found that the assimilative process of behaviour identification was independent of cognitive load, whereas the subtractive process of dispositional attribution was undermined by load. These investigators also found that invalidating the information on which the behaviour identification process was based, by stating that the actor was unaware of the potential situational demands on their behaviour, did not alter these identifications, whereas invalidating that same information did alter the dispositional judgements. Two alternative explanations may account for these results: (1) that the two processes are qualitatively distinct, (2) that for some reason the behaviour identification task in Trope and Alfieri's (1997) work was less demanding than the dispositional attribution task.

Consistent with the latter interpretation, Trope and Gaunt (2000) discovered that when demands associated with the dispositional attribution task were lowered (e.g., by increasing the salience of the information given), the subtraction of context from dispositional attributions was no longer affected by load. Furthermore, Chun, Spiegel, and Kruglanski (2002) found that when the behaviour identification task was made more difficult (e.g., by decreasing the salience of the information given) it was also undermined by load. Under those conditions, too, invalidating the information on which the behavioural identifications were based did alter these identifications.

These findings are consistent with the present notion that, when a given inferential task (e.g., of “behaviour identification” or of “dispositional attribution”) is sufficiently demanding, it is exigent of cognitive resources and can be undermined by load.

Base-rate neglect. Earlier, we suggested that the judgemental impact of information depends on individuals appreciating its (subjective) relevance to the question at stake, and that such appreciation, in turn, depends on the relation between inferential task demands and processing resources. Jointly, these notions are capable of casting a new light on the problem of base-rate neglect, and on conditions under which statistical versus “heuristic” information may impact individuals’ judgements.

In the original demonstrations of base-rate neglect (Kahneman & Tversky, 1973) the base-rate information was typically presented briefly, via a single sentence, and upfront. By contrast, the individuating (“representativeness”) information was presented subsequently via a relatively lengthy vignette. If one assumes that participants in such studies had sufficient motivation and cognitive capacity to process the entire informational “package” with which they were presented, they might have been challenged to fully process the later, lengthier, and hence more demanding vignette information and to have given it considerable weight in the ultimate judgement. This is analogous to the finding in persuasion studies that the lengthier, later-appearing, message argument information but not the brief, upfront-appearing, “cue” information, has impact under ample processing resources (e.g., of high processing motivation and cognitive capacity). If the above is true, we should be able to “move” base-rate neglect around by reversing the relative length and ordinal position in the informational sequence of the base-rate and the individuating (“representativeness”) information. A series of studies by Chun and Kruglanski (2006) attempted just that.

In our first study we replicated the typical lawyer–engineer paradigm (Kahneman & Tversky, 1973) in one condition by presenting brief and upfront base-rate information followed by lengthier individuating information. In another condition we reversed these relations by presenting brief individuating information first followed by lengthier and more complex base-rate information. To make the information complex and lengthy, the overall base-rate of lawyers was decomposed into base-rates of various sub-categories. For example, rather than being told that engineers made up 70% of the population and lawyers made up 30% of the population, participants were told that the population consisted of 14% electrical engineers, 6% chemical engineers, 9% divorce lawyers, 4% nuclear engineers, 10% civil engineers, 11% criminal lawyers, 12% sound engineers, 8% genetic engineers, 10% trade lawyers, and 16% mechanical engineers. As predicted,

the former condition replicated the typical finding of base-rate neglect, whereas the latter condition revealed considerable base-rate utilisation.

A subsequent study added a manipulation of cognitive load in which participants rehearsed a nine-digit number while reading the information. As shown in Figure 8, the former results were now replicated in the low load condition, but were reversed in the high load condition. Under high cognitive load, when the base-rate information was presently briefly upfront, participants judged the likelihood of Dan being an engineer to be greater in the 70% engineer condition as compared to the 30% engineer condition. However, there was no significant difference between the two engineer conditions in the low cognitive load condition. This shows a use of the base-rate information while under load if the base-rates are easy to process. In contrast, when the base-rate information was lengthy and presented at the end, participants under load did not judge the likelihood of Dan being an engineer differently in the 70% as compared to the 30% condition. However, participants not under load did judge the likelihood of Dan being an engineer as significantly higher in the 70% condition as compared to the 30% condition. This demonstrates the use of base-rates when participants are not under load when the base-rates are difficult to process. Regardless of information type, under load the brief upfront information was utilised more than the lengthy subsequent information, whereas in the absence of load, the lengthy and subsequent information was utilised more.

To summarise then, evidence across domains (i.e., of persuasion, attribution, and judgement under uncertainty) supports the hypothesis that the higher the demands imposed by the inferential task at hand, the greater

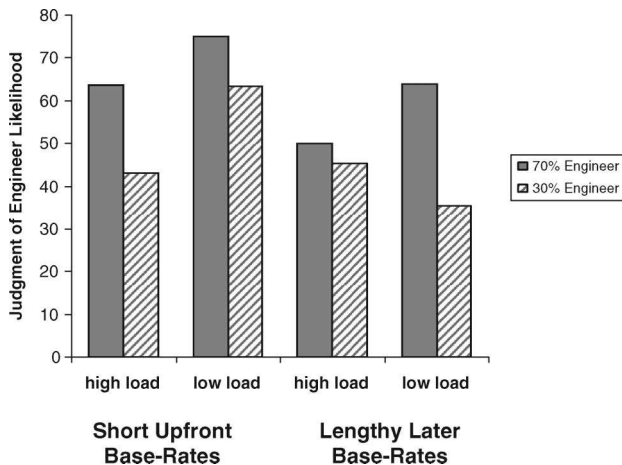


Figure 8. The effect of cognitive load, base-rate information, and difficulty of base-rate processing on likelihood estimation judgements (Chun & Kruglanski, 2006).

must be the processing resources if the information given is to exert judgemental impact commensurate with its potential relevance.

Relative relevance, task demands, and processing resources. Often the different types of information presented to research participants have (inadvertently) differed in their subjective relevance to these persons. For instance, in the domain of persuasion Pierro, Mannetti, Kruglanski, and Sleeth-Keppler (2004) carried out an extensive content analysis of experimental materials in persuasion studies to conclude that, typically, the “cues” presented to participants were judged as less relevant to the judgemental (attitudinal) topic than were the “message arguments”. Recall that in much persuasion research the “cues” but not the “message arguments” exerted judgemental impact under low processing resources, whereas the “message arguments” did so under high processing resources. From the present perspective, it is possible to generalise these findings in terms of the following derivations:

(a) Given ample processing resources, the *more relevant* information (e.g., the “message arguments” in much persuasion research) would have a greater judgemental impact than the *less relevant* information; however (b) given limited processing resources (relative to the task demands) the *easier to process* information (of above threshold relevance) would have a greater judgemental impact than the *more difficult to process* information.

Pierro and colleagues (2004) tested these notions in three experimental studies based on the same research design in which (1) the relevance sequence (early information less relevant than subsequent information, or vice versa) and (2) processing motivation (high, low) were manipulated orthogonally. However, the studies differed in contents of the information given. In the first study, both the early and the later information consisted of message arguments; in the second study both consisted of heuristic information (namely, pertinent to the “consensus heuristic”) and in the third study, contrary to the typical sequence in persuasion research, the early information consisted of message arguments and the later information, of heuristic cues (again regarding consensus).

All three experiments yielded the same general result: When the later, and hence the more difficult to process, information was more subjectively relevant to the judgemental topic than the early information, it exerted judgemental (persuasive impact) only under high motivation conditions but not under low motivation conditions. By contrast, the early, less relevant information exerted its effect only under low motivation but not under high motivation. A very different pattern obtained where the early information was more relevant than the latter information. Here the impact of the early information invariably overrode that of the later information: Under low processing motivation this may have been so because the earlier information

was easier to process than the later information, and under high processing motivation—because the early information was in fact more relevant than the later information.

Metacognitive inferences: Ease versus content of retrieval. In recent years social psychologists became increasingly interested in the problem of metacognitive inferences (for reviews see Jost, Kruglanski, & Nelson, 1998; Petty, Brinol, Tormala, & Wegener, 2007). One of the most researched metacognitive phenomena of social psychological interest has been the “ease of retrieval” effect in self-perception. The fascination with this phenomenon goes back to Tversky and Kahneman’s (1973) classic work on the availability heuristic pertaining to the “ease with which instances or associations come to mind” (p. 208). In a well-known follow-up on Tversky and Kahneman’s work, Schwarz et al. (1991) attempted to disentangle the experience of “ease” from the number of instances recovered because of the felt ease. For instance, in one of the Schwarz et al. (1991) studies participants were asked to retrieve either 6 or 12 instances of behaving assertively. Presumably it is easier to retrieve a few instances of a given behaviour than many instances. Hence, if ease of retrieval is responsible for the availability effect, participants should perceive themselves as more assertive after recalling 6 instances of assertive behaviour than after recalling 12 such instances. That is precisely what Schwarz et al. (1991) found, suggesting that the metacognitive experience of ease or fluency can serve as an important determinant of social judgements.

Following this seminal research, a variety of further studies sought to identify the boundary conditions for the ease of retrieval effect and to pinpoint the circumstances under which alternative sources of information (such as the content versus amount of retrieved information) would have a stronger judgemental effect than ease of retrieval (for reviews see Petty et al., 2007; Schwarz, 2004). Although a number of such boundary conditions were empirically identified, work on this topic stopped short of providing general theoretical understanding of circumstances under which a given information source (rather than its alternatives) would affect judgements. The unimodel affords such understanding. From its perspective, any contextually given information may affect judgements if it fits (as a minor premise) an inference rule (a major premise) to which an individual subscribes.

Support for this possibility was recently obtained in several experimental studies by Igou, Fishbach, and Kruglanski (2008). Specifically, this work demonstrated that the degree to which ease of retrieval versus the amount of instances retrieved affect social judgements depends on (1) the perceived validity of the inference rule linking *ease* of retrieval or the amount of instances retrieved to the corresponding trait, (2) saliency of the information concerning ease or amount of instances, and (3) accessibility of the

ease = trait, and the amount = trait rules. For example, participants in one study were asked to rate the friendliness of targets based on the information provided. They were told that three people had been asked to recall instances in which they had been friendly. The information regarding the ease of retrieving relevant information, the amount of information retrieved, and the content of the retrieved information was manipulated. One target person ostensibly found recalling friendly behaviours to be either “easy” or “difficult”, another either listed “many” or “only a few” behaviours, and the third recalled behaviours that were either “very friendly” or “only somewhat friendly”. Participants rated the target person as friendlier in cases in which the target found it easy to recall behaviours, recalled many behaviours, or were very friendly. However, these differences were more pronounced (and were statistically significant only) when the critical pieces of information were underlined in the text, making the relevant piece of information salient.

Conclusions. Growing evidence from a variety of domains (persuasion, attribution, judgement under uncertainty, person perception) supports the unimodel’s derivations that the subjective relevance of information determines its impact on judgements, that the appreciation of subjective relevance depends on the relation between task demands and (cognitive and motivational) resources, and that as a function of resources information may affect judgements either in accordance with its relative relevance or with its relative ease of processing.

Focusing on the concept of “evidence” highlighted by lay epistemic theory affords an integration of a large set of dual-process models of social judgements that assumed binary, qualitatively distinct, modes of processing. Such integration is achieved by highlighting the critical importance of several judgemental parameters in determining the impact of the information given on individuals’ judgements and impressions, and by separating (both conceptually and empirically) the values of such parameters (e.g., information’s degree of subjective relevance, or experienced difficulty of processing) from informational contents with which they were often confounded in prior research (for a more extensive discussion see Kruglanski et al., 2007).

Epistemic authority: The “who” of epistemic behaviour

According to lay epistemic theory the construct of evidence functions in the same way (i.e., syllogistically) irrespective of the specific contents of evidence. This doesn’t mean, however, that all types of evidence have equal status. Different individuals may hold different assumptions about the conditional (if . . . then) relations between conceptual categories; hence

they may differ in what to them constitutes compelling evidence for a given proposition. For an expert car mechanic an unusual noise emanating from the engine may compellingly signal a problem with the carburettor, whereas for a mechanically inexperienced individual this particular noise may have little informative value. In general, people's "evidential" assumptions in specific domains may vary widely depending on their background knowledge. Because people's concerns typically extend beyond their domains of expertise they may often rely on other people as knowledge providers. Thus a broad category of evidence refers to other people's opinions and is denoted by lay epistemic theory's construct of *epistemic authority* (Kruglanski, 1989; Kruglanski et al., 2005), that is, to a source on whom an individual turns to obtain knowledge on various topics (Kruglanski, 1989). In other words, individuals may subscribe to general "if X then Y" rules in which the antecedent X denotes a given epistemic authority, e.g., of an expert ("If Expert says so then it is Correct"), the group ("If the Group believes so, then it is Correct"), or the self ("If I believe so, then it is Correct").

The concept of "epistemic authority" is akin to the notion of *source credibility* (encompassing a combination of perceived expertise and trustworthiness) and it addresses the extent to which an individual is prepared to rely on a source's information and to accept it as evidence for the veracity of the source's pronouncements. The ascribed epistemic authority of various sources in the individuals' social environments may vary and the authority of a given source may vary across domains as well as across individuals' life-span developmental phases.

The features that identify a source as an epistemic authority can be *general*, having to do with seniority (for example, of an elder), a role (for example, of a priest, a leader or a teacher), level of education (for example, a PhD), appearance in print (for example, in a book or a newspaper), or *specific*, as in assigning epistemic authority to a particular person, or a particular newspaper (say, the *New York Times*).

Furthermore, a source may exert influence in numerous life domains, serving as a *generalized epistemic authority*; alternatively, it may influence only a specific area (for example, cardiology, statistics, or auto mechanics) where it is thought to possess valid knowledge. In the former role we may find priests, therapists, or parents, whereas in the latter role we may find specialists in certain well-defined fields. Individuals may differ widely in their reliance on various epistemic authorities and in their extent of such reliance across domains. Some people may accept the judgement of a source (a rabbi, a priest, a psychiatrist, or a teacher) in any life domain; others may consult a source with regard to matters related to its specific domain of competence, and to consult other sources in alternative life domains.

Source characteristics (such as expertise) were often implied to offer somewhat inferior counsel as to correct judgements, and were treated as suboptimal heuristics used only when one's processing resources were depleted and when one's "sufficiency threshold" of required confidence was low (Chaiken, Liberman, & Eagly, 1989). In contrast, according to the present theory epistemic authority of some sources (e.g., a religious prophet, a parent, a political leader, or the printed word) might be extremely powerful, often to the point of overriding other types of information and exerting a determinative influence on individuals' judgements and corresponding behaviours. Furthermore, whereas in prior treatments of source credibility effects, the discussion centred on sources *external* to the self (cf. Chaiken et al., 1989; Hovland, Janis, & Kelley, 1953; Kruglanski & Thompson, 1999a, 1999b; Petty & Cacioppo, 1986), the present theory considers the *self* as a particularly important target of epistemic authority assignments.

Research summarised in the paper by Kruglanski et al. (2005) has revealed (1) developmental trends involving a decline in authority assigned to the primary caregivers, coupled with an increase in epistemic authority attributed to the *self*, and involving an increase in differentiation and specificity of epistemic authorities across domains; (2) stable individual differences in epistemic authority effects; (3) a hierarchical structure and operation of epistemic authorities; (4) the relative role of the self and external sources as perceived epistemic authorities.

Developmental trends

Raviv, Bar-Tal, Raviv, and Houminer (1990) assessed children's attribution of epistemic authority to their *mothers, fathers, teachers, and friends*. They investigated kindergarten children (4–5-year-olds), first graders (6–7 years old), and third graders (8–9 years old). Several significant trends appeared in these data, yielding the following pattern of interest: during childhood (i.e., during the ages 4–10), (a) the perception of parents as epistemic authorities remains relatively stable, with decreases in a few knowledge areas, (b) the perception of the teacher as an epistemic authority remains stable with an increase in the area of science, (c) the perceived epistemic authority of friends increases in the social domain.

Raviv et al. (1990) also found that across age groups the perception of teachers and friends varied more as a function of knowledge areas than the perception of parents. The children selected teachers and friends as epistemic authorities in certain knowledge areas only, whereas the parents tended to be perceived as overall authorities across domains, possibly as a function of continued material dependence on the parents inducing a motivation to view them as all powerful and knowledgeable.

Individual differences in the distribution of epistemic authority assignments across sources

Individuals differ systematically in their distributional profiles of epistemic authority across sources: these differences, in turn, affect individuals' search for, and use of, information. Bar (1983) devised a Hierarchy of Epistemic Authorities Test designed to investigate the epistemic authority assigned by Israeli college students to various sources. This test revealed intriguing gender differences in epistemic authority assignments. In domains prototypically classified as masculine (such as work and finances) women viewed their *peer group* as a more dominant epistemic authority than did men, whereas in domains prototypically classified as feminine (social life, interpersonal relations, children's education) men endowed their *peer group* with greater epistemic authority than did women. Possibly then, where one's own epistemic authority is low (as may be the case for men in the feminine domains, and for women in masculine domains) one's reference group gains in epistemic authoritativeness as compared with domains where one's self ascribed epistemic authority is high.

The hierarchical organization of epistemic authorities. In Bar's (1983) research individuals' epistemic authorities predicted these people's behaviour in an "information-purchasing" task: Participants were willing to pay greater amounts of (hypothetical) money for information from their highest (domain-specific) authority than for information from lower epistemic authorities. This and other findings suggest the hierarchic organisation of epistemic authorities. Bar (1983, 1999) found that individuals turn first to information provided by sources whom they regard as highest in epistemic authority, that they process such information more extensively, that they derive from it greater confidence, and that they tend more to act in accordance with its perceived implications.

Bar (1999, Study 2) also inquired whether epistemic authority effects might not represent the workings of heuristic cues relied upon only in the absence of sufficient processing resources. To that end, Bar superimposed on her product choice procedure orthogonal manipulations of time pressure (high versus low) and evaluation apprehension (high versus low). Contrary to the suboptimal heuristics hypothesis the foregoing effects held across variations in time pressure and evaluation apprehension: Regardless of the presence/absence of time pressure and/or of evaluation apprehension participants (1) tended to first open the window on a PC pertaining to their dominant (versus non-dominant) epistemic authority, (2) were more confident in their decisions if those were based on the recommendations of a dominant (vs a non-dominant) epistemic authority, and (3) tended to spend more time on information contained in a "window" belonging to their

dominant (vs non-dominant) epistemic authority. These results argue against the notion that epistemic authority functions merely as a “peripheral” or “heuristic” cue that affords low confidence and is used only when individuals’ processing resources or motivational engagement are low.

Effects of self-ascribed epistemic authority: External information search under need for closure. A unique aspect of the epistemic authority construct is that it treats identically the *self* and *external sources* of information. Indeed, several recent studies looked at informational effects as a function of the self-ascribed epistemic authority. In one such study, Pierro and Mannetti (2004, cited in Kruglanski et al., 2005) measured the strength of individuals’ self-ascribed epistemic authority in the highly specialised domain of cell phones. To that end, they constructed a 13-item scale including questions such as “I truly have considerable knowledge about different types of cell phones”, “I can say a great many things about technical specs of different cell phones”, “I can offer people useful advice regarding the purchase of a cell phone”. Pierro and Mannetti (2004) also assessed their participants’ dispositional need for cognitive closure. The main dependent variable of interest was participants’ readiness to search for information from external sources in case they entertained the purchase of a cell phone. It was found that the higher the individuals’ *self-ascribed epistemic authority* in a domain, the less external information they purported to seek.

Of greater interest, the tendency to seek external information was moderated by the need for cognitive closure. For individuals with low self-ascribed epistemic authority, the higher their need for closure, the stronger their tendency to engage in an external information search. For individuals with high self-ascribed epistemic authority, the higher their need for closure, the lower their tendency to engage in an external search, and presumably the higher their tendency to rely on their own experience and experts. In other words, under the pressure for cognitive closure individuals are forced to choose, and to discriminate more acutely between their various epistemic authorities in selecting the source they trust the most.

Self-ascribed epistemic authority and learning from experience. Among the most interesting implications of the epistemic authority construct are those concerning *learning from experience*. The concept of “experience” has long been privileged in psychological theory. The use of experiential learning in training and education has been inspired by John Dewey’s (1916, 1958) instructional philosophy, Carl Rogers’ (1951, 1967) person-centred approach to therapy, and humanistic psychology more generally (e.g., Shafer, 1978). In social psychology, Fazio and Zanna (1981) suggested that attitudes acquired via direct experience with the attitude object are the strongest, and most tightly related to behaviour. Yet these authors also

hinted at the possibility of *moderators* that qualify the power of experience in shaping attitudes. As they put it (Fazio & Zanna, 1981, p. 184):

An attitude formed by indirect means could conceivably also be held with extreme confidence, and, hence, be more predictive of behaviour than a direct experience attitude. For example, a child's attitude towards members of a given ethnic or racial group may be held with great confidence, even though formed indirectly because of his or her parents' extreme credibility.

This quote suggests that experience *may not* constitute a superior base of knowledge under all conditions. Yet Fazio and Zanna (1981) stop short of identifying the conditions under which direct experience will be less capable of shaping attitudes. The concept of self-ascribed epistemic authority may be helpful in this regard.

From this perspective, whether or not an individual would treat her or his personal experience as a reliable knowledge base may depend on this person's self-ascribed capability to draw reliable conclusions from the experience, or on her or his self-ascribed epistemic authority in a domain. In absence of such authority a person may fail to draw confident knowledge from the experience. An individual may speak English all her life without deriving the principles of English grammar from this experience; she may drink a wide range of wines over the years without forming notions about the different varietals or vintages; or play tennis on a weekly basis without forming notions about the proper strokes, strategies, and tactics of this game.

Our analysis suggests that the extent to which individuals tend to draw confident conclusions from any type of information is related to their assignment of authority to the information source. When the information consists of one's own experience, the source simply is oneself. In these circumstances, the higher one's self-ascribed epistemic authority, the more readily one may trust one's own interpretation of information, and the more one might be able to "benefit" from the experience. However, when the information is interpreted by an external communicator (e.g., a teacher or a parent), the individual's tendency to accept the interpretation may partially depend on the perceived gap in epistemic authority between the source and the self. When the authority imputed to the source is considerably higher than that imputed to the self, the source's pronouncements are likely to be attended closely and/or be assigned considerable weight. However, when the assigned authorities are more nearly equal, the source's statements might not be taken as seriously because of a sense that there is little the source could contribute over and above one's own ability to process the information.

In other words, a "reverence effect" may be expected whereby pronouncements by an external source will have greater impact on persons whose perceived *authority gap* between themselves and the source is large rather than small. In a study designed to investigate these notions, Ellis and

Kruglanski (1992) assessed their participants' self-ascribed epistemic authority in mathematics via a questionnaire specifically designed for this purpose. Participants also responded to the numerical aptitude test (Cattell & Epstein, 1975) to serve as a control measure for their actual maths ability, and they filled out a post-experimental questionnaire designed to assess their perceptions of their own and the instructor's epistemic authority in mathematics.

The mathematical learning task employed in this research consisted of multiplication problems in which some numbers were replaced by letters. The participants' task was to substitute the numbers for the letters. These substitutions were carried out in accordance with five arithmetic rules that participants needed to learn in the course of the experiment. Participants were randomly assigned to one of three experimental conditions: In the *experiential* condition they were given self-instruction booklets with exercises related to the five arithmetic rules. In the *instructional-principles* condition the experimenter was introduced as a PhD in mathematics, and he explicitly articulated the relevant mathematical principles. In the intermediate, *instructional-examples*, condition the instructor solved the problems on the board *and* stated the arithmetic principle underlying each solution.

Following these procedures, participants took a performance test on the principles they had just been taught. Participants in the two instructional conditions were additionally asked to estimate the gap in ability between themselves and the instructor. The results of this research indicated that method of instruction significantly interacted with participants' self ascribed epistemic authority (SAEA). The results are shown in Figure 9. Controlling for participants' actual mathematical ability, in the *experiential* condition participants with a high SAEA did significantly better than participants with a low SAEA. In the *instructional principles* condition the low SAEA

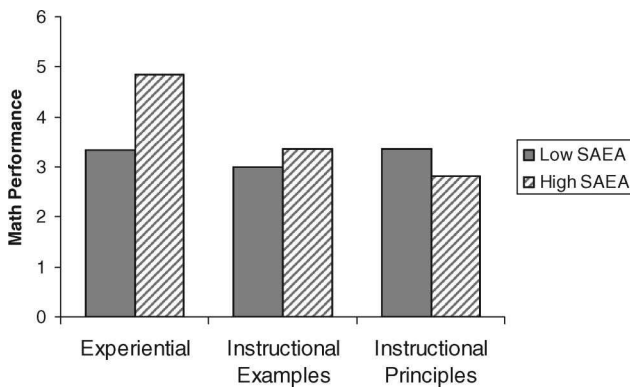


Figure 9. The effect of self-ascribed epistemic authority (SAEA) and instructional condition on maths performance (Ellis & Kruglanski, 1992).

participants tended to do better than their high SAEA counterparts, and in the intermediate, *instructional-examples* condition the high and low SAEA participants did not differ in their performance.

In the two instructional conditions participants with a high SAEA perceived the gap between their own and the instructor's ability as significantly lower than did participants with a low SAEA. Of greater interest, in both instructional conditions participants who perceived a large gap between themselves and the instructor did better in both instructional conditions than participants who perceived a smaller gap. A large gap indicates that the source's relative epistemic authority (compared to one's own) is considerable. This may turn the recipient into a "true believer", enhancing her or his readiness to accept the source's conclusions.

These findings identify an important boundary condition on the efficacy of experience as a mediator of learning. It appears that in order to be able to learn from experience individuals need to believe in their ability to draw inferences from the experience; that is, possess high self-ascribed epistemic authority in a domain. It is of particular interest that self-ascribed epistemic authority is empirically distinct from actual ability in a domain. In the study described here the correlation between the two, though significant, was relatively low ($r = .36$), and the interaction between SAEA and method of instruction remained significant, even after controlling for actual mathematical ability. Finally, it is of interest that in the instructional learning conditions participants whose perceived gap between own and instructor's ability was large (vs small) did significantly better at the mathematical learning task, attesting to a "reverence effect" whereby the impact of an external source is greater if its authority is high relative to one's own perceived authority.

Summary. Although according to lay epistemic theory all evidence functions in the same (syllogistic) manner, the evidence category subsumed under the notion of epistemic authority is special in a number of respects. It represents the fundamental notion that human knowledge is socially constructed and that it is heavily influenced by the opinions of significant others whose judgements one holds in high regard. It also touches on the *developmental aspect* of knowledge construction, the liberation of one's knowledge formation processes from reliance on a limited number of primary care givers, the evolution of epistemic self-reliance, and the diversification of one's array of information sources in accordance with their perceived domains of expertise. The concept of epistemic authority also acknowledges that individuals (as well as groups) may exhibit relatively stable differences in their hierarchy of epistemic authorities, which determines who they will turn to for information and advice, and on whose recommendations they will act. Finally, this concept suggests that individuals' tendency to independently process domain-specific information on a topic may be a function of a *gap*

between their own self-ascribed epistemic authority and the perceived authority of a given communication source.

INTEGRATING THE WHY, HOW, AND WHO OF LAY EPISTEMICS

The three research programmes inspired by the lay epistemic theory illuminate distinct aspects of knowledge formation. The need for closure programme focused on the *motivational underpinnings* of the process. The unimodel programme addressed the mechanism of justifying (or “proving”) one’s judgements and conclusions via the appropriate *evidence* and the psychological process that permits the information given to become such evidence. Finally, the epistemic authority programme addressed the essential *meta-cognitive, developmental, and differential* aspects of knowledge formation that determine how individuals function in their informational ecologies to form their opinions and attitudes.

It is of interest to consider how the three categories of process embodied by the foregoing research programmes interface, and what implications follow from their possible interrelations. The need for closure (representing the “why” of epistemic behaviour) represents a desire for firm knowledge. In turn, firm knowledge requires a firm inferential basis; that is, availability in memory of firmly believed-in rules or major premises to which situationally present information may be fitted, functioning as minor premises (representing the “how” of epistemic behaviour). It follows that, under high need for closure, individuals may be more likely *to form* such rules, as well as have a chronically accessible variety of general, “all-purpose” rules (or “heuristics”) that they can use across a broad spectrum of situations.

Consistent with this logic, Dechesne and Wigboldus (2008) recently discovered that individuals high in need for closure are especially prone to form rules or notice systematic patterns even when not explicitly instructed to do so. Participants in the experiment were instructed to use designated keys on the keyboard to indicate as quickly and accurately as possible whether an A or a B appeared on a computer screen. The experiment consisted of 280 trials. Importantly, the As and the Bs appeared in a fixed order of ABBABAB. Awareness of this pattern, and its use as a rule, facilitates responding to upcoming stimuli. A reduction in response latencies over time can thus be interpreted as a manifestation of a stronger tendency to form and use inferential rules to respond to situational demands. To the extent that high (vs low) need for closure fosters the motivation to form and use rules, a more pronounced reduction of response latencies over time was expected to occur among high (vs low) need for closure participants. That is precisely what was found. As shown in Figure 10, downward trends in response latencies significantly covaried with the need for closure, such that higher need for closure was associated with a more pronounced trend in the

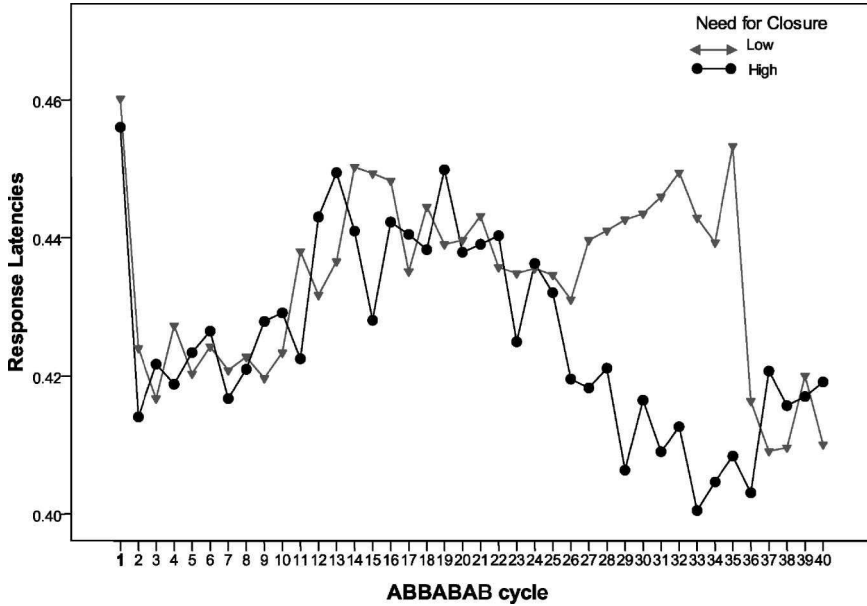


Figure 10. The effect of ABBABAB cycle and need for closure on response latencies (Dechesne & Wigboldus, 2008).

downward direction. Admittedly, the Dechesne and Wigboldus (2008) results could be due to motivated attention to the stimuli, rather than the tendency to form rules as such. Further studies (currently under way) are needed to explore in a more comprehensive manner the hypothesised rule-forming proclivity of high need for closure individuals.

It also seems plausible that high (vs low) need for closure individuals should subscribe to beliefs about general, all-purpose, epistemic authorities. A unique such authority is one's own self. Consistent with this notion, high (vs low) need for closure individuals have been consistently reporting higher confidence in their judgements, possibly reflecting a high self-ascribed epistemic authority, attesting to reliance on the "I am generally right" or "If it is my judgement, then it is correct" heuristic (Kruglanski, 2004). Moreover, considerable evidence reviewed earlier attests to group-centric tendencies under heightened need for closure (Kruglanski et al., 2006). A major aspect of group-centrism is the quest for consensus, or the "group is right" heuristic; that is, "if my group believes it, then it is correct" heuristic. There is also evidence that individuals under high need for closure prefer an autocratic or hierarchical decision-making structure, possibly reflecting the bestowal of epistemic authority on anointed experts, or operation of the "experts are correct" heuristic ("if expert, then correct"). In this sense the

heightened confidence, the group-centric tendencies, and the autocratic orientations observed under high need for closure may all represent a reliance on broad, “all-purpose” rules affording a general inferential base for knowledge formation. Finally, as findings of Pierro and Mannetti (2004) suggest, under a heightened need for closure individuals may sharpen their discrimination between various epistemic authorities and come to rely more fully on their *dominant* epistemic authority, occupying the top of their epistemic hierarchy.

In short, the three research programmes based on the lay epistemic theory interlock in significant ways. Because knowledge is based on evidence, and evidence reflects an operation of “If Then” inferential rules, individuals who are particularly motivated to have stable knowledge (i.e., those with an elevated need for closure) may quickly construct such rules from contingency information. Because general inferential heuristics may afford quick formation of knowledge across diverse content domains, individuals with a high need for closure may be particularly prone to bestow domain-general epistemic authority on various agents including themselves.

Understanding these interrelated epistemic processes and their representation in real-world circumstances where knowledge formation may assume heightened psychological importance promises to offer new insights into a variety of social problems besetting contemporary societies. For instance, it would be of considerable interest to consider how uncertainty promoted by economic and political turmoil may elevate whole populations’ need for cognitive closure, and how such need, in turn, might lead to group-centrism and derogation of (and readiness to engage in violence against) outgroups, as well as fostering the readiness to embrace fundamentalist, closure-affording, ideologies and epistemic authorities. In our own work we have found that exposure of participants to an uncertainty-evoking event, recall of the 9/11 attack on the Twin Towers in New York, elevated individuals’ need for cognitive closure, and that need for closure increased participants’ tendencies toward ingroup favouritism, and outgroup derogation, as well as the positive evaluation of decisive and consistent (“staying on course”) leaders and negative evaluation of open-minded and flexible (“flip flopper”) ones (Orehek et al., 2007). Applying the theory of lay epistemics to major real-world phenomena constitutes an exciting challenge for future generations of research on knowledge formation processes, with significant contribution potential to policy in broad domains of endeavour.

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