

*Group Consensus and
Minority Influence
Implications for Innovation*

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Conflicts and Social Influences in Hypothesis Testing

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Introduction

How many times have we, as researchers, thought: "This other representative of the field has demonstrated the opposite of what my work shows. I must prove that he or she is wrong"? Of course, it is difficult to admit having such unfriendly and antipathetic thoughts. However, it is not uncommon to think like this when coping with disagreement or conflict. This issue has been very well documented by sociologists of science, and Lemaine (1984) pointed out that in the scientific community social comparison is a very frequent phenomenon, that generally aims at acquiring "visibility".

What do conflict and social comparison – which are relational processes – have to do with science, which is, after all, a matter of reasoning and testing hypotheses? The idea that will be put forward in this chapter is that, in order to understand the mechanisms that underlie reasoning in general and hypothesis testing in particular, it is important to consider that people always reason for a purpose, surrounded as they are by people who sometimes agree but at other times disagree, and that therefore science never happens in an ivory tower but is most of the time a matter of social influence. On this basis, it becomes apparent that many mechanisms in reasoning and hypothesis testing that are generally seen as biases or errors when compared to normative theories (such as formal logic, laws of probability, etc.), can be understood as useful mechanisms when social needs such as the confrontation of viewpoints are taken into account. In this chapter we will show how conflicts that arise during social influence situations affect, and are affected by, reasoning strategies.

Hypothesis Testing and Confirmation "Bias"

Hypothesis testing has been extensively studied by both cognitive and social psychologists. The reason for such an interest is twofold. First, hypothesis testing is a central human activity, from everyday inferences (e.g., Kruglanski, 1980; Kruglanski & Ajzen, 1983) to inductive reasoning in scientific thinking (e.g., Mitroff, 1974; Tweney, Doherty, & Mynatt, 1981). Second, research on hypothesis testing has shown a peculiar systematic tendency toward confirmation: Individuals asked to test their hypotheses appear to do so most of the time through procedures aiming at providing support for these hypotheses, even in tasks where disconfirmation would be more diagnostic. After Wason's pioneer work (1960), this "bias" has been found in work on inductive reasoning (e.g., Mynatt, Doherty, & Tweney, 1977; Gorman & Gorman, 1984), deductive reasoning (e.g., Wason, 1966; Evans, 1982), and information selection (e.g., Snyder, 1981; Snyder & Swann, 1978), to name but a few tasks and situations (for reviews, see e.g., Evans, 1989; Holyoak & Spellman, 1993; Leyens, Dardenne, Yzerbyt, Scaillet, & Snyder, 1999).

The explanations that have been put forward to account for this "bias" (or "error") are as numerous as the researchers that have studied this phenomenon. However, three trends seem to be quite well accepted. One line of research considers the "confirmation bias" as a form of positivity bias in reasoning, because of cognitive difficulties in considering negative information. Evans, for instance, proposes an explanation in terms of "cognitive failures": "Subjects confirm, not because they want to, but because they cannot think of the way to falsify" (1989, p. 42). Another line of research explains that there is a general bias in information processing that leads individuals to focus on the first sufficient hypothesis, without taking into account the alternatives that could lead to the "true hypothesis" (McDonald, 1990; see also Green, 1990; Legrenzi, Girotto, & Johnson-Laird, 1993). The third line of research considers that, since people do not possess a "mental logic" (the capacity to use the rules of logic without having studied it, as proposed by the Piagetian tradition), disconfirmation in hypothesis testing is just too difficult. As Johnson-Laird (1983) proposed, taking alternatives into account needs several "mental models" to be built, which takes a great amount of working memory.

These lines of research nevertheless have a common ground: They seem to agree about the fact that confirmation as a "bias" is due to a lack of activation, analysis, and articulation of alternative solutions to a problem (cf. Gorman & Carlson, 1989; Green, 1990; Johnson-Laird, 1983; Kruglanski &

Mayesless, 1988; McDonald, 1990; Trope & Mackie, 1987). In fact, it has been noted that disconfirmation is indeed possible, but only when the reasoner is able to consider alternative solutions (Gorman & Carlson, 1989).

The question that arises from this work then, is why some people are able to activate cognitive mechanisms that can lead them to be less "biased." Is it a matter of acquired competences? Research on scientific thinking, showing that scientists can be just as biased as lay people, seems to reject this idea (e.g., Mahoney, 1976; Mitroff, 1974). The analysis that led to the research paradigm presented in this chapter considers that hypothesis confirmation and disconfirmation are reasoning processes that are specific to some particular social situations (Butera, Legrenzi, Mugny, & Pérez, 1991-92). Indeed, hypothesis testing most often takes place during situations of social confrontation, that is, in situations where one may be confronted by the alternative hypothesis proposed by someone else; this is particularly evident in the case of scientific reasoning. It thus appears that it is of utmost importance to study the conflicts that arise from these social influence situations in order to understand the differential use of confirmation and disconfirmation in inductive reasoning.

High-status and low-status source influence in inductive reasoning

The social psychology of influence has shown that exposure to a majority's model or proposal induces conformity (Moscovici, 1980) and cognitive functioning of a convergent type, that is, confined to the use of information at hand (Nemeth, 1986; Nemeth, Mosier, & Chiles, 1992). This means that the presence of a majority's proposal would induce individuals to use the source's hypothesis when formulating their own. Convergent thinking should then orientate people's reasoning to take into account only the characteristics of this hypothesis and its elements; thus, it is likely that individuals, when testing a hypothesis, would formulate positive examples, that is, examples that are compatible with the hypothesis under test. In short, individuals would be oriented toward the use of confirmation in social situations characterized by a consensus expectation leading to conformity to the majority.

Furthermore, research in social influence has shown that when a model is given by a minority source, individuals are not motivated to adopt it (Moscovici, 1980), because the source does not guarantee the validity of its proposal (Nemeth, 1986). Thus, in a problem-solving task, where individ-

uals must come to a reliable solution, it is difficult to trust a minority source when assessing a judgment. The notion of divergent thinking (Nemeth, 1986) is useful to account for the cognitive processes occurring during problem solving when faced with a minority source. On the one hand, "minorities stimulate a greater consideration of other alternatives" (Nemeth, 1986, p. 25); in fact, several studies show that confrontation with a minority source actually induces a search for alternatives (Nemeth & Kwan, 1985; De Dreu & De Vries, 1993; De Dreu, De Vries, Gordijn, & Schuurman, 1999; Volpato, Maass, Mucchi-Faina, & Vitri, 1990). Moreover, a study by Huguet, Mugny, and Pérez (1991-92) suggests that minority influence implies an activity of decentration, that is, the induced possibility of taking into account several points of views when formulating a judgment. In the case of the formulation of a hypothesis, it is thus legitimate to think that individuals confronted with a minority's proposal would be less motivated to adopt it and would then be led to choose or formulate alternative hypotheses.

On the other hand, from an information-processing point of view, individuals exposed to minority influence "are stimulated to attend to more aspects of the situation" (Nemeth, 1986, p. 25). Nemeth suggests furthermore (1986, p. 28) that divergent thinking leads to a kind of information processing that can be described as more systematic (cf. Chaiken, 1980). The same idea underlies Moscovici's notion of validation, when he argues that confrontation with a minority source leads to a greater focusing on the issue under consideration in order to check the validity of one's own judgment as well as that of the minority's judgment (Moscovici, 1980, p. 215), and also in order to check the limits of the validity of a judgment (Mugny, Butera, Pérez, & Huguet, 1993).

The above implies that, in hypothesis testing, minority influence induces mechanisms that make it possible to question the limits of the validity of a hypothesis, and therefore the use of negative examples, that is, examples that are not compatible with the hypothesis under test. This in turn should favor the use of disconfirmation. Thus, the possibility of considering the existence of alternative hypotheses gives disconfirmation its necessary condition: the possibility of imagining a replacement solution (it would be absurd to test through disconfirmation the only available hypothesis). In short, individuals would be oriented toward the use of disconfirmation in social situations where the existence of alternative solutions is elicited by the opposition between one's own hypothesis (which it is not necessary to give up for conformity reasons) and the minority alternative hypothesis.

Table 8.1 Majority or Minority Source: Mean Number of Yielding (from 0 to 2) and Mean Number of Disconfirmations (from 0 to 4)

	Majority		Minority	
	Unity	Plurality	Unity	Plurality
Yielding	1.74 ^a	0.74 ^b	0.78 ^b	0.32 ^c
Disconfirmation	0.31 ^a	1.26 ^b	0.98 ^b	2.97 ^c

Note: For each measure, means sharing the same subscript are not significantly different at $p < 0.05$.

with a minority use disconfirmation more than those confronted with a majority. These results suggest that confirmation would be more typical of confrontation with majority sources, while disconfirmation would occur when confronted with minority sources.

These initial studies did not explain why this pattern of results was found. A subsequent experiment was designed to test the idea that confirmation would be more typical of confrontation with majority sources because they exert a pressure toward considering one single answer; disconfirmation would be more typical of confrontation with minority sources because they induce subjects to be open to alternative solutions (Brandstätter et al., 1991). This would explain why confirmation is so frequently found, since inductive reasoning is generally at work in very normative settings, whether the experimental setting of a laboratory or the actual functioning of a scientific research team.

An experiment was devised to test the hypothesis that a majority source induces more yielding and more confirmation because it produces a representation of the task in terms of unity, and that a minority source induces the consideration of alternative hypotheses and the use of disconfirmation because it produces a representation of the task in terms of plurality (Butera, Mugny, Legrenzi, & Pérez, 1996). In a 2×2 design, the first variable concerned the nature of the source (either a majority or a minority), and the second the representation of the task; with this variable, participants were told that the task allowed either one single correct answer (unity), or several possible answers (plurality).

Results showed (see Table 8.1) that the nature of the source induced differential effects, as found in previous experiments. Importantly, the represen-

Majority and Minority Studies

In a preliminary study (Legrenzi, Butera, Mugny, & Pérez, 1991), participants had to discover the rule underlying a given number triad (e.g., 2-4-6). This task, devised originally by Wason in 1960, is one of the most widely used tasks for the study of inductive reasoning. It is an interesting task for the current purposes because, although using disconfirmation would be more diagnostic (as it makes it possible to increase the generality of tested hypotheses), confirmation is used by the large majority of participants. In our experimental setting, participants were asked to formulate a hypothesis and to propose a number triad for testing it. Before doing so, participants had been informed of the hypothesis ("Each new number is greater than the previous one") and of the triad proposed by either a majority (82%) or a minority (12%) of people who had already participated in the study. The triad proposed by the majority or minority source was either confirmatory (e.g., 8-10-12), or disconfirmatory (e.g., 12-10-8) with respect to the source's hypothesis. The results showed that, when formulating hypotheses, more participants used the source's hypothesis in the majority conditions (even if it was in order to reformulate it), whereas more participants formulated completely new hypotheses when the minority used a confirmatory strategy. As for the hypothesis-testing strategies, although confirmation was the dominant strategy in all conditions, more participants used disconfirmation when this strategy was proposed by the source (which is in line with the results of Gorman & Gorman, 1984). More importantly, when the source proposed confirmation for testing hypotheses, participants confronted with a majority almost never used disconfirmation, while participants confronted with a minority (those who proposed the highest rate of completely new hypotheses) formulated disconfirmatory triads more often than majority condition participants. The latter result occurred in spite of the fact that disconfirmation was proposed neither by the source, nor by experimental instructions. In a second experiment (Butera & Mugny, 1992), again a majority induced more hypotheses derived from its own hypothesis as well as more confirmatory examples than a minority did; moreover, a minority induced more participants to formulate completely new hypotheses and to use disconfirmatory hypothesis testing.

Taken together, these two experiments showed that individuals consider the majority's hypothesis as informative, since they use it more frequently to elaborate their own hypotheses; in contrast, when confronted with the minority's hypothesis, they elaborate new and original hypotheses. In hypothesis testing, confirmation is the most frequent strategy, but individuals confronted

tation of the task induced differential effects too, as this is supposed to be the mediating variable accounting for the source's effects. As for the correspondence between nature of the source and representation of the task, results show that participants confronted with a majority engaged in more yielding to the source's hypothesis and in more confirmation when the task was represented as unidimensional. Moreover, participants confronted with a minority engaged in a greater use of alternative hypotheses (different from those suggested by the source) and in more disconfirmation when the task was represented as allowing a certain diversity of solutions.

These results suggest that a majority source focuses hypothesis elaboration on its proposed model. Representation of the task in terms of unity induces a similar effect, as participants focus more on the source's model. These processes are more pronounced when the majority nature of the source matches the corresponding representation of the task, in which case informational dependence on the majority source produces imitation. This need for consensus renders the search for alternative hypotheses not only useless (Kruglanski, 1990) but also dangerous, as the focus on a single hypothesis necessitates its validity and therefore calls for a testing strategy that does not contradict it - confirmation. The effects attributed to majority influence in problem solving would then be mediated by a representation of the task in terms of unity, and would be less pronounced when plurality is allowed.

When the proposal of a problem-solving model comes from a minority, very few participants adopt its proposal and, when possible, they formulate more new hypotheses. The same happens when a representation of the task in terms of plurality is induced. This specifies that divergent thinking implies avoiding focusing on a single judgment. This idea is supported by the fact that the minority's effects are more pronounced in case of a correspondence with the representation of the task in terms of plurality. It is in this case that the highest rate of disconfirmation is found, which shows that the possibility of considering alternatives is a fundamental factor for a problem-solving procedure leading to validation, in the sense of a search for the validity and the limits of validity of the source's proposal as well as that of other possible alternatives. In this context disconfirmation is likely to be used, as it is no longer aimed at invalidation, but at integrating the alternatives.

These findings have interesting implications for group decision making; they actually show the finer mechanisms underlying the "groupthink" phenomenon (Janis, 1972). In fact, Janis showed that during group decision making, the presence of a single dominant position reduces the likelihood of

appearance of alternative hypotheses, thereby reducing the likelihood of challenging a potentially bad decision. The above results demonstrated that when people are confronted with a majority in a context that allows one single answer, not only is the dominant (majority) position adopted, but the very process of reasoning is adapted (through confirmation) to produce a mindset that avoids taking alternatives into account. Groupthink produces confirmatory reasoning, which in turn reduces the likelihood of diagnostic decision making.

Competence and Uncertainty

Induction is a form of reasoning that is used in specific sets of problems, those that need a general law to be inferred from the observation of a regularity. The *conflict elaboration theory* (Mugny, Butera, Sanchez-Mazas, & Pérez, 1995; Pérez & Mugny, 1993, 1996) contends that when people are confronted with an influence source during problem solving, what is really at stake is aptitude. In fact, solving a problem shows mastery of intellectual or technical tools that assigns people to a certain hierarchical position on some competence scale.

When aptitude is at stake in a task, individuals are particularly motivated to give a correct answer, or at least the best possible answer (cf. Festinger, 1954). Therefore, when solving problems in a social influence situation, targets are motivated to estimate the probability that the source can be informative about the correct or the most adequate solution. According to conflict elaboration theory, two different mechanisms are at work depending on the source's attributed competence. If the source is an expert, a competent source, its solution will be regarded as an *informational support*. Expertise guarantees validity (cf. Chaiken, 1980). This would induce imitation, with little task processing, since the expert source's answer is adopted on the basis of the guarantee given by the expert's (high) status. If the source is a novice, a low-competence source, the target cannot adopt its answer since the probability that it is the correct answer is low. However, the target cannot discard the source's answer, since in problem solving individuals are typically uncertain and they are not sure they have the correct or the best possible solution. Therefore, confronting a low-status source in an aptitude task leads to a *conflict of incompetencies* (Butera & Mugny, 1995; Maggi, Butera, & Mugny, 1996), that of the source (who has no status to be considered competent) and that of the target (who is judging under uncertainty). This would lead to a close examination of the task and to a decenteration from the two existing points

of view, in search of an answer that would guarantee validity; latent, constructivistic influence should then appear.

If one applies this theoretical framework to the third study presented in the previous section (Butera et al., 1996), the observed results appear to be consistent. A high-status source (a majority) induced imitation and a low-status source (a minority) induced constructivism. However, this experiment manipulated the majority or minority nature of the source, and not directly its competence. It is true that according to Nemeth (1986) there is a relation between the source's numerical support and the inferences that people make about the probability that the source holds a correct answer: People are motivated to consider that majorities are generally right and minorities are generally wrong. However, both Nemeth and Butera et al. (1996) only manipulated the numerical support of the source and there was no proof that manipulating the source's competence would produce the same results (imitation of the high-status source and constructivism when confronting the low-status source).

In a fourth experiment (Butera, Mugny, & Tomei, 2000, Study 1), the source's status was manipulated directly on the basis of its declared competence. Participants were again asked to solve two inductive reasoning problems (choosing a hypothesis and testing it), being confronted with a source that was either an expert or a novice (plus a control condition without influence). Following conflict elaboration theory, individuals consider the high-status source's model as an informational support or they find themselves in a conflict of incompetence when confronting a low-status source because they are uncertain, the typical condition of someone attempting to solve a problem. Therefore, half of the subjects were led to believe that the solution was either highly unpredictable (uncertainty) or easily predictable (certainty): The hypothesized influence effects should appear under uncertainty and not under certainty (cf. also Festinger, 1950).

A significant interaction between the two variables showed that the predicted influence effects appeared only under uncertainty, and this for both yielding and disconfirmation (see Table 8.2). With yielding, the high-status source is the one that participants imitated the most and the low-status source the one that participants imitated the least. However, this was true only under uncertainty: When participants were certain, the imitation rate was the same whatever the source. With disconfirmation, the reverse was observed: The highest rate of disconfirmatory testing was used by participants confronted with a low-status source, whereas the lowest rate appeared when participants were confronted with a high-status source, again only under uncertainty.

Table 8.2 Competence of Source: Mean Number of Yielding (from 0 to 2) and Mean Number of Disconfirmations (from 0 to 4)

	Uncertainty			Certainty		
	Expert	Novice	Control	Expert	Novice	Control
Yielding	1.42 ^a	0.40 ^b	0.96 ^c	0.88 ^c	0.90 ^c	0.88 ^c
Disconfirmation	0.50 ^a	2.60 ^b	1.04 ^c	1.16 ^c	1.21 ^c	1.24 ^c

Note: For each measure, means sharing the same subscript are not significantly different at $p < 0.05$.

This study showed how, in a task involving aptitude (namely logic), individuals who are uncertain (which is generally the case in problem solving) are highly sensitive to the competence of a source that proposes a model of solution. If the source has a high status – a competent source – individuals rely highly upon the source's model and imitate it. It thus appears that confirmation then has a *protection function*. Since individuals prefer autonomy when competence is at stake (cf. Lemaire, 1974), those who imitate the source then have to be sure that this costly yielding leads to a correct solution, and therefore use a testing strategy that brings support to the borrowed hypothesis and does not imply the risk of invalidating it – confirmation. In fact, participants with the highest yielding rate also had the lowest disconfirmation rate (i.e., the highest confirmation rate).

The highest disconfirmation rate appeared when participants were uncertain and were confronted with a low-status source: These are the conditions that, according to conflict elaboration theory, produce a conflict of incompetence. In fact, not only do individuals not know if they will be able to solve the problem, but the source's status does not seem to guarantee the validity of its answer. In this respect, disconfirmation has a *research function*: It makes it possible to test the limits of validity of a hypothesis. Again it appears that confirmation and disconfirmation are typical of specific social situations, and they seem to serve specific social functions. This idea was tested in studies summarized in the next section.

Conflicts in Hypothesis Testing

The results observed in the above studies suggest that imitation of a high-status source in aptitude tasks is not a mere form of compliance (Moscovici,

1980), but serves to reduce uncertainty (which is uncomfortable when aptitude is at stake), to produce more confidence in the validity of one's own judgment, and to establish confidence in one's own competence. Yet, what happens when individuals cannot yield to the high-status source? This is an important question: Not only are people motivated to keep their autonomy when aptitude is at stake (as pointed out before), but there are numerous situations in which people cannot yield. This is the case when individuals have already committed themselves to a particular judgment, when they have a particular status to protect, or when they feel threatened by the source.

So, what happens when individuals are led to oppose a high-status source, an expert? The source's high competence implies that its answer is the good one: People use heuristics such as "Experts hold correct judgments" (Chaiken, 1980). If individuals consider a highly competent source as being right, and they do not yield, this implies that they are incompetent, since their answer is different and therefore wrong. In this situation, the source's competence directly threatens the target's competence, leading to what can be called a *conflict of competences* (Butera, Gardair, Maggi, & Mugny, 1998; Mugny, Butera, & Falomir, in press). This is a conflict produced by the fact that targets cannot recognize the source's competence without implying their own incompetence. The consequence would be that individuals whose competence is threatened by a high-status source in a problem-solving task are more concerned with relational matters than with the actual features of the task. This should lead to a relational solution of the task (trying to be better than the source), instead of an epistemic solution (aiming at discovering a valid answer). These considerations stemmed from the following study.

The conflict of competences and the conflict of incompetences

This study (Butera et al., 1998, Study 1) was designed to investigate the effect of an inevitable conflict (not to be solved through imitation) in an aptitude task. Again the task involved solving a series of inductive reasoning tasks when confronted with the solution of an influence source. However, in this task the cover story attributed a hypothesis to the participants that they had to defend and justify. When participants had thoroughly appropriated the hypothesis, they were informed of the source's hypothesis, which was different from theirs. The source was either an expert or a novice. The task then continued with hypothesis testing, without providing an opportunity to reformulate the hypothesis: The conflict was apparent and could not be reduced.

In previous studies, participants always tested their own hypothesis. If disconfirmation appeared, it was clearly used for an epistemic purpose (cf. Popper, 1955), that is, testing the limits of validity of their hypothesis. However, Gorman and Carlson (1989) pointed out that, within the scientific community, disconfirmation – although quite rarely used in scientific induction – appears very frequently when testing competing theories or hypotheses: "Disconfirmation of other's ideas can be a successful investment heuristic as well" (p. 101). In this case, disconfirmation does not have an epistemic purpose but a relational one: to discredit the validity of competing hypotheses. We therefore asked half of the sample to test their own hypothesis, and the other half to test the source's hypothesis.

Results showed that when participants confronted a low-status source (a novice), the disconfirmation rate was equally high for the test of their own hypothesis as for the test of the source's hypothesis. This supports the idea that a conflict of incompetence stemming from confrontation with a low-status source orients the individual's activity toward the epistemic purpose of testing the validity of the hypothesis. Therefore no differences appear, whatever the target of testing, a sign that elaboration is directed toward the task and not toward the relationship.

When people confronted a high-status source, disconfirmation rate changed according to the target of testing. If they tested the source's hypothesis, disconfirmation rate was high, as high as that found for the low-status conditions. If they tested their own hypothesis, disconfirmation rate was very low, significantly lower than all the other conditions. So it seems that confrontation with a high-status source is relation-dependent. The almost exclusive use of confirmation in testing one's own hypothesis when confronted with the high-status source can be interpreted as a way of adding support (confirmation brings evidence) in a competitive relationship. If this is true, the use of disconfirmation found in participants testing the high-status source's hypothesis can be interpreted as a way of discrediting, through invalidation, the source's answer. Disconfirmation would then be used in an epistemic way when confronted with a low-status source, and in a relational, competitive way when confronted with a threatening high-status source.

Some observations are in line with the above interpretation. First of all, in the high-status source conditions, participants were more likely to declare that their purpose in testing was to prove that their idea was good and that the other's idea was wrong. Conversely, in the low-status source conditions, participants were more likely to declare that their purpose in testing was to discover which idea, among a set of alternatives, was correct. Second, when

participants were asked to rate the source's and their own perceived competence at the task on two independent scales, a significant positive correlation appeared when participants were confronted with the low-status source, while a significant negative correlation appeared when participants were confronted with the high-status source. Therefore, it appears that participants perceive a competitive relationship with the high-status source, and prepare to "fight"; conversely, they perceive a more cooperative relationship with the low-status source and seem to be more task-oriented. However, although these elements provide a hint for interpretation, they do not prove that the disconfirmation that appeared in the high-status source condition is different in origin (namely relational) from that appearing in the low-status source condition (namely epistemic).

Research on the social development of the intellect has shown that constructs developing from a relational conflict disappear as soon as the relationship is over, since they do not correspond to real learning. Conversely, sociocognitive conflict (based on epistemic motives) can lead to a generalization of the effects, leading to true constructivism (Doise & Mugny, 1984). Therefore, the present study — that was also designed to investigate the dynamics of relational versus epistemic disconfirmation — concluded with a generalization problem. This problem was a Wason's 2-4-6 classic task, that had to be completed individually, with no comparison with a source. All participants were requested to test their own hypothesis. Results showed that no more differences appeared in the disconfirmation rate of participants previously confronted with a high-status source: Participants who previously tested their own hypothesis and those who tested the source's hypothesis both displayed the same very low rate of disconfirmation (they mainly used confirmation). However, participants who were previously confronted with a low-status source displayed a significantly higher disconfirmation rate, whatever the target (own or other's hypothesis) previously tested. This presents a more robust argument that in the high-status condition disconfirmation had a relational, invalidating function: It appeared mostly when participants had to test the source's idea (cf. Gorman & Carlson, 1989), and disappeared when the confrontation was over, showing that nothing was learnt from its use. The opposite seems to be true for confrontation with a low-status source: Disconfirmation is used whatever the target of testing, and its use persists after the influence relationship, showing some kind of constructivism.

To sum up, two important conclusions can be drawn from these results. First of all, we can confidently conclude that confirmation is not merely a bias and disconfirmation is not always an ideal diagnostic test, but that they are reasoning strategies adapted to specific social situations. In fact, it was

demonstrated that disconfirmation, far from being the idealized tool of scientific falsification, can serve competitive purposes when used to test hypotheses coming from a threatening source. Second, more elements appeared that contribute to characterizing the conflict of competences and the conflict of incompetences. In the conflict of competences, it appears that when one cannot imitate a competent source, one's own competence is threatened: Since disengagement cannot be reduced, because one answer is correct and the other one is not, the implication is that one person is competent and the other one is not. This leads to the perception of a negative interdependence between target and source (as shown by the negative correlation mentioned above). Individuals focus on the conflict with the source (they attempt to invalidate it), rather than on the characteristics of the task, which gives a self-serving, rather than diagnostic, processing of the problem.

The conflict of incompetences was already well documented in previous studies, but the present one presents two additional ideas. First, the positive correlation that participants established between their competence and the source's competence shows that they do not perceive the low-status source as an opponent, but rather as someone "in the same boat." This allows them to concentrate on the characteristics of the tasks, which explains the higher level of constructivism. Second, the lack of a relational problem is clearly shown by the fact that participants used disconfirmation in an epistemic way even when they were testing the source's hypothesis. In the following two sections we will present two experiments that directly manipulate these characteristics.

The conflict of incompetences and independence

The hypothesis tested by the following experiment was that the constructivist impact of a low-status source supposes that individuals do not perceive themselves as much more competent than the source. The condition for a real conflict of incompetences to occur would indeed be for individuals to doubt their own competence as much as that of the source. Our prediction was that the constructivist effect of the low-status source in such an aptitude task will be stronger if the participants regard their degree of incompetence as close to that of the source than if they emphasize their own competence relative to the source's incompetence.

The procedure was exactly the same as in the previous experiment, except that participants were confronted only with a low-status source (a novice). After having appropriated the criterion they were to stand by, and having

enhanced their superiority over the novice, whose competence was denied. In the independence condition participants did not establish such a large difference between self and other. Both means are close to 50%, which is characteristic of a conflict between incompetences. Whereas the correlation between points attributed to oneself and the novice is logically -1 in the negative interdependence condition, it is significantly positive in the independence condition. As for hypothesis testing, participants in the negative interdependence condition used disconfirmation significantly less than those in the independence condition, reaching an overall rate that is comparable to what is called *confirmation bias* in the cognitive psychology literature.

The role of independence within the conflict of incompetence was clearly demonstrated in this study. This is theoretically very important because it shows that individuals display high levels of constructivism when the source's competence is not threatening. When the source's competence is evaluated within a competitive relationship (negative interdependence) individuals are led to produce a *downturn comparison* (Wills, 1981), that is, a comparison that aims more at self-enhancement than at self-improvement (Wood & Taylor, 1991). In fact, although they evaluated their competence as being much higher than that of the source, the disconfirmation rate stayed very low.

The conflict of competences, independence, and decentration

Independence proved to be an important factor in the constructivistic effects induced by the conflict of incompetences. In the characteristics that were mentioned above for the conflict of competences, it was noted that one of the problems in the relationship with a high-status source is that individuals spontaneously perceive a negative interdependence between their competence and that of the source. The following study (Butera et al., 2000, Study 3) tested the idea that evaluating independently the source's and the target's competence can decentrate the target from the relational conflict and induce more constructivism. Decentration also seems to be a problem in the conflict of competences. In fact, in this conflict individuals seem to be tied to relational matters without a real motivation to decentrate from this focusing effect (L'egrenzi et al., 1993) in order to consider the content of the source's proposal and/or other features of the task. Therefore, the following study investigated the possibility of enhancing constructivism by leading individuals in a conflict of competences to decentrate and to

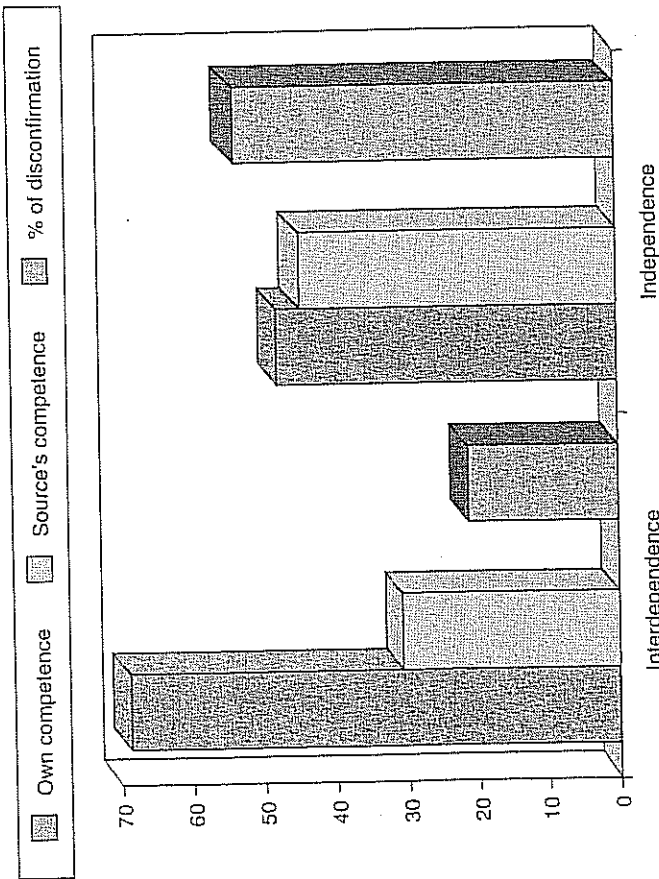


Figure 8.1 Mean points attributed to own and to source's competence, and mean percentage of disconfirmation.

read the one proposed by the novice, participants were asked to compare themselves to the novice on four characteristics: competence, qualification, skill, and expertise. This comparison aimed at operationalizing two modes of relations between participants' competence and that of the source. In the negative interdependence mode, for each characteristic, participants were asked to share a total of 100 points between the source and themselves: The novice's incompetence thus serves as the condition for the participant's competence (what is given to one is denied to the other). In the independent mode, participants had 100 points to attribute to themselves and another 100 points for the novice; this condition was intended to elicit a conflict of incompetences. This experimental manipulation has proved to induce a fairer distribution of points (Mummeley & Schreiber, 1983); in a task dominated by uncertainty, this distribution should reflect the participants' doubts concerning their own competence as well as that of the source.

Results (see Figure 8.1) showed that, although participants generally gave themselves more points, in the negative interdependence condition they

consider the possible complementarity between their hypothesis and that of the source.

The procedure and materials for the present study were the same as for the two previous studies. The source was always a high-status source, and again participants were led to disagree with the source without having the opportunity to reduce this opposition. They then evaluated (as in the previous experiment) their competence and that of the source, either in an independent mode, or in a negatively interdependent mode. Half of the sample was exposed to a decentration procedure (Huguet et al., 1991-92), whereas the other half was not. Participants in the decentration condition were invited to look in a black box, half of them through a hole on the top, the other half through another hole on the side. They then had to write down what they had seen and exchange their sheets of paper. To their great surprise, they discovered that half of them had seen a triangle and the other half a square. They then had to guess what was in the box. Since nobody found the correct answer, the experimenter opened the box and took out a square-based pyramid, and explained that very often in everyday life we have the impression that we face incompatible points of views, but when we make the effort to integrate them, we can find that seemingly incompatible judgments can be different but complementary sides of a more complex reality.

Results showed two main effects: Independence in judgments of competence induced more disconfirmation than negative interdependence, and the decentration condition induced more disconfirmation than did the condition without this procedure (see Figure 8.2). Therefore, the basic conflict of competences condition - negative interdependence and no decentration - induced the lowest rate of disconfirmation. When the two postulated problems that create a conflict of competences are counterbalanced, the disconfirmation rate improves, and in the condition with both interdependence and decentration, the highest disconfirmation rate appears. In this condition, target and source are no longer opposed by a conflict of competences, but the high-status source can be beneficial as it is related to the target in a sort of *informational interdependence* (Mugny et al., in press; Quiamzade, Mugny, Falomir & Butera, 1999). This is an important result for the present line of research and has practical implications for the use of expertise, for instance in work settings. In fact, previous studies showed that confrontation with a high-status source in problem solving leads either to yielding (if the source can be imitated), or to a relational conflict (if the opposing positions are seen as incompatible). Only confrontation with a low-status source produced an appreciable level of constructivism. However, solving problems efficiently with an expert is possible, as shown every day by work groups. This last experiment shows

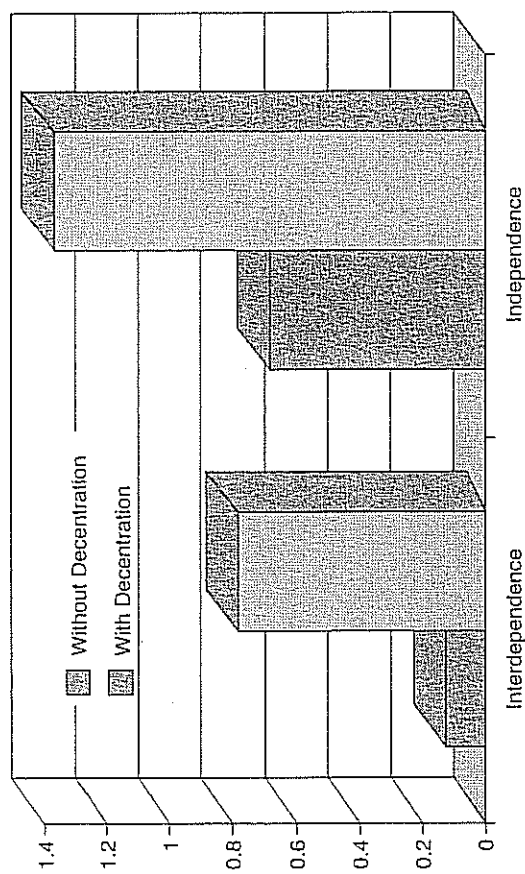


Figure 8.2 Mean number of disconfirmations (from never to twice).

the conditions in which it is possible to find constructivistic effects when confronted with an expert, even if a divergence opposes the two points of view. First, competences must be evaluated in an independent way: One of the problems with the relation with a high-status source is that its competence can be perceived as a threat to the target's competence. Second, targets must be able to defocus, to decentrate, and to consider that an opposing view can bring a complementary contribution toward a correct judgment. When these two conditions are met, target and source are in informational interdependence: They can use both judgments to construct a more complex reality.

Conclusions

The work presented in this chapter leads us to draw two kinds of conclusions, one concerning hypothesis-testing mechanisms, and another concerning social influence when aptitude is at stake. With hypothesis testing, the work done in individuating the social factors that influence the use of confirmation showed that "confirmation bias" is not a bias: Its use is neither wrong nor uncoercible. It was shown that confirmation is used in particular

social influence situations and that it seems to have a specific function of protecting individuals' competence. When individuals give up their autonomy in order to imitate a high-status source, confirmation warrants that this costly yielding does not prove to be wrong. When individuals are in blatant disagreement with a threatening high-status source, confirmation makes it possible to bring support to their own position. It was also demonstrated that disconfirmation – which can indeed be diagnostic when the motivation is epistemic – is not always used as a strategy for testing validity and the limits of validity. It was shown how disconfirmation can serve competitive motives in the attempt to denigrate the opposing source. To sum up, confirmation appears as a bias – that is, a systematic behavior – only because reasoning over difficult problems leads to uncertainty, and if competence is at stake this can be threatening; confirmation can then bring the necessary support.

In the case of social influence, inductive reasoning seems to be determined by the specific type of conflict between targets and the source. Since competence is at stake in reasoning tasks, the regulation of competence organizes the dynamics of influence in these tasks. When the source is low in status, acquiring competence needs an effort, since the source does not guarantee the validity of its answer, but targets' uncertainty does not allow them to discard it; they must therefore decenter and take into account the characteristics of the task, instead of using relational heuristics. This is the conflict of incompetences, which is an epistemic one, based on the fact that a low-status source does not threaten the targets' competence, which gives them freedom to work on the task. In fact it was shown that when targets are forced into competition by a negative interdependence with the source, they are led to produce a downward comparison that relieves their perceived competence, but that dissolves all the constructivistic effects typical of confrontation with a low-status source.

When the source is high in status, it is possible to reach a correct answer by imitating the competent source. Although keeping one's own autonomy is very important, in particularly constraining situations (e.g., representation of unity) targets use the source's answer as an informational support to their own judgment. But there are times when the high-status source cannot be imitated and the disagreement cannot be reduced. Targets are then in a conflict of competences: They cannot conceive that two different answers can be two facets of the same reality, since they focus more on the comparison of competences than on the task; however, they are threatened by the high competence of the source, since it is considered as a negation of their own competence. The result of this conflict is that targets concentrate on protecting their point of view and on denigrating the source's, instead of working on

the properties of the task. However, if targets can overcome this threatening conception of the relation to a high-status source, they can process the characteristics of the task, and social influence can result in constructivistic effects, because targets can consider the source as being in an informational interdependence: A sort of nonthreatening cooperation between competent people. Learning and developing are a matter of social influence.

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