The conflict of incompetences: Direct and indirect influences on representation of the centimetre*

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Abstract

This paper reports two studies of the influence of a source, presented either as competent or as incompetent, on estimations of lengths which the source consistently underestimates. Direct influence is measured in terms of reduction of these estimations, indirect influence by increase in the length of a line drawn to correspond to a specified length. In experiment 1 subjects (N = 134) were led to believe that they also were either competent or incompetent at this kind of task. Direct influence was greater among the non-competent than the competent subjects, and greater when the source was competent than when the source was incompetent. Indirect influence was only significant for incompetent subjects confronted with a source who was likewise incompetent. Experiment 2 replicated the conditions for subjects (N = 57) led to believe they were incompetent, and generated the same pattern of results for these conditions. The constructivism induced by a low

Key words:
Direct and indirect influence, comparison of competences, aptitude task, constructivism

Résumé

On étudie l'influence d'une source, présentée soit comme compétente, soit comme incompétente, sur l'estimation de longueurs que celle-ci sous-estime avec consistance. L'influence directe est mesurée par la diminution de ces estimations, l'influence indirecte par l'augmentation de la longueur du dessin d'une ligne d'une longueur donnée. Dans l'étude 1 (N = 134) les sujets sont également amenés à penser qu'ils sont soit compétents, soit incompétents dans ce type de tâche. L'influence directe est plus importante chez les sujets non compétents que chez les sujets compétents, et plus importante pour la source compétente que pour la source incompétente. L'influence indirecte n'est significative que pour les sujets incompétents confrontés à une source également incompétente. L'étude 2 (N = 57) réplique les conditions avec des sujets amenés à penser qu'ils sont incompétents, et retrouve les mêmes dynamiques. Le constructivisme induit par la source de basse

Mots clés:
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competence source is discussed in terms of the notion of conflict of incompetences (uncertainty concerning the validity of the self and the other).

compétence est discuté sur la base de la notion de conflit d'incompétences (incertitude concernant la validité de soi et d'autrui).

Introduction

Several studies show that in tasks which require subjects to demonstrate a certain aptitude (for example, problem-solving) changes can be produced which do not involve a simple convergence on the position of a source of influence but which represent genuine socio-cognitive reconstructions of the source's position. These effects of socio-cognitive constructivism have generally been attributed to the elaboration of conflict with a low status source (Pérez & Mugny, 1993). Thus several studies show that a minority can induce the employment of new problem-solving strategies, a more complex structuring of information recall (*cf.* Nemeth, 1994), or use of a more diagnostic hypothesis testing strategy (Legrenzi, Butera *et al.*, 1991).

It has been argued that in this type of aptitude task, the constructivism of low status sources arises from the fact that subjects find themselves in a *conflict of incompetences* (Butera & Mugny, 1995). In effect problem solving is a task demanding an objective response which is unavailable to the subject. Thus, because of the uncertainty, and because these tasks involve the subjects' aptitudes (*cf.* Maggi & Mugny, 1995), a fear of invalidity can be aroused (Kruglanski, 1989). As the source has low status, it provides no informational support and subjects find themselves in a conflict of incompetences, their own and that of the source. This conflict can lead subjects to greater validation efforts and as a result to a more complex elaboration of the information provided (Butera, Mugny *et al.*, 1996).

The studies to be presented test this hypothesis in conditions where the (greater or lesser) competence of the sources is directly manipulated rather than being merely inferred on the basis of its minority or majority status. Though we have in practice supposed that individuals generally work on the assumption that the majority is right while minorities are presumed to be wrong (*cf.* Huguet, Nemeth & Personnaz, 1995), there has been no formal demonstration of this, nor has any experiment yet distinguished between the majority/minority and competence/incompetence dimensions. The target's degree of competence (high or low) is also manipulated and on the same basis as for the source.

The predictions concerning direct influence are, as previously, that this will be in direct proportion to the competence of the source and of the subject (for reviews see Allen, 1965; Jones & Gerard, 1967). The predictions concerning indirect influence are in contrast novel and paradoxical: such influence is anticipated only when there is a conflict of incompetences (the condition in which both source and target have low competence), which is to say when neither party possesses the legitimate status to determine the correct response and when comparison with an equally incompetent source increases the motivation to treat the information with the goal of improving one's performance (*cf.* Rijsman, 1974, experiments 2 and 3).

Direct and indirect influences: The logic of a paradigm

The direct versus indirect nature of the influences measured requires particular attention here, because of the scepticism that has been voiced (*cf.* Kruglanski & Mackie, 1990; Mackie, 1987; De Dreu & De Vries, 1996) about the latent influence effects reported using the "blue-green" paradigm (cf. Moscovici & Personnaz, 1980, 1986) although similar results have been observed in other experimental paradigms dealing with perception processes (*e.g.* Brandstätter, Ellemers *et al.*, 1991; Butera, Huguet *et al.*, 1994).

In the present studies we used a task involving estimations of length under conditions such that these estimations involve some uncertainty (Flament, 1958), in contrast to the studies cited above in which the task solution was *a priori* obvious. Subjects in our studies had to estimate the length of lines of an average of 20 cm (or 10 cm in experiment 2) having been informed that a source had estimated their length as 9 cm on average (or 5 cm in experiment 2), thus consistently underestimating the length. Direct influence concerns the estimations made of these lengths, the influence of the source being apparent in so far as subjects reduce their own estimations. In other words they are making use of the information provided by the source to determine their own responses. Note that a control condition allows us to determine whether influence effects in the experimental conditions differ from the spontaneous responses of subjects who are not exposed to an influence source.

As regards indirect influence, this is assessed by asking subjects to draw a line of a specified length. At this level there are two possible reactions. The first is to generalise the organising principle underlying the source's responses, namely underestimation, which should therefore lead to shorter lines being drawn. This would certainly involve a social influence if it occurred, consisting of a simple transposition to the drawing task of the underestimation principle, though it would consequently repre-

sent an "overgeneralisation" of the principle of underestimation (*cf.* Crano, 1994). A different elaboration of the source's system of responses could in contrast lead to longer drawings, as a result of the following inference: if 20 cm are judged to be 9, this is because the representation of the centimetre underlying the source's responses is of a longer centimetre (than the metric centimetre, but more particularly longer than the subjects' mental centimetre). If this form of influence appears, which we anticipate in the condition involving a conflict of incompetences, it may be attributed to a constructivist process, here a process producing a change in the mental representation of the centimetre.

Experiment 1

Method

Sample

134 subjects (males and females, between 13 and 55; median age 21 years), recruited by our students as part of their practical work, participated in the experiment in a laboratory room, for the most part in groups of 4. Subjects were separated by partitions and did not communicate with one another.

Experimental design

Subjects were divided according to a 2 x 2 design into competent and non-competent categories on the basis of their alleged performance on a pre-test. They were then exposed to the responses of a source who was also presented as either competent or incompetent. In a control condition subjects were given no feedback on their own competence, nor were they provided with the responses of a source.

Pre-test

Subjects' first task was to estimate the length of lines varying in size, presented on placards, and to record their estimations on a plain sheet of paper. There were six vertical lines (18 cm, 20 cm and 22 cm long) each presented for 10 seconds, and four visual illusions (Ponzo, Titchener, Müller-Lyer and inverted T) for which they had to estimate the rectilinear segments. In addition, they had to reproduce and estimate the length of lines in two visual illusions (inverted T and Müller-Lyer). This pre-test, which was presented as a test of estimation of geometric figures, was in reality the pretext for induction of the first independent variable.

Competent and incompetent subjects

The responses were collected for analysis and after some minutes feedback was given on a 100-point scale from a performance of 0 = "zero" to 100 = "perfect". Half the subjects learned that their score was 24, corresponding to a capacity for estimation explicitly described as mediocre, while the other half found that they had been accorded a score of 78 which corresponded to capacities described as excellent.

Influence phase: competence versus incompetence of the source

During this phase subjects estimated twelve vertical lines (two of 18 cm, two of 22 cm and eight of 20 cm), and the experimenter announced before each ten second presentation the (fictional) response of a person reputed to have obtained, depending on condition, a score of 24 (incompetent source) or 78 (competent source). The source's response was for each item an underestimate, the average of the estimates being 9 cm (to introduce some plausibility the source responded 9 cm eight times, and 10 cm and 8 cm twice each) so as to provide a consistent underestimation (*cf.* Moscovici & Lage, 1976) of length.

Post-test

The same tasks were used as in the pre-test to provide filler items. The key measure consisted of drawing a line (with a length of 8 cm) and estimating its length. The post-test was followed by a questionnaire to provide a manipulation check. Finally a debriefing explained the aims of the experiment and the purpose of the manipulations.

Dependent variables

Two measures were examined in the analysis of the results. Direct influence was represented by the average of the estimations made in the experimental phase (and therefore in the presence of the source), the stimuli presented in reality averaging 20 cm. Positive influence was therefore reflected in lower estimations. Indirect influence was measured by the length of the vertical lines drawn to represent the 8 cm line, which the source had given no judgement of and which was evidently a different length to the other lines. A longer line could be considered as an index of elaboration of the source's response which is to say a modification in the representation of the centimetre itself. In effect, the fact that the source underestimates a line's length implies that the source has a representation of the centimetre as greater than it is.
These two measures were then analysed on the basis of a 2 x 2 factorial design. In addition each of the experimental conditions

was compared with the results obtained in the control condition, in which the procedure was in all respects identical except for the lack of any manipulation of the competence of the subjects and the lack of any information about the responses of a source.

Results

Manipulations check

One question asked subjects if the task involved was one at which they were competent (1 = no, 7 = yes). The subjects who had been given a score of 78 responded in the affirmative (m = 4.16) rather more than those given a score of 24 (m = 3.02; F 1/108 = 16.133; $P < .001$). The manipulation of self-perceived degree of competence appears therefore to have been effective.
Subjects were also asked about the competence of the source (1 = no; 7 = yes). The responses revealed a main effect of subject competence (competent, m = 2.68; non-competent, m = 3.20; F 1/108 = 3.608; $P < .06$) as well as a main effect of source competence (competent, m = 3.21; incompetent, m = 2.65; F 1/108 = 4.136, $P < .05$). These effects are coherent reflections of the experimental inductions. The significant interaction (F1/108 = 4.871, $P < .03$) arises because non-competent subjects confronted with a competent source were those who judged the source to be the most competent (m = 3.79), and indeed significantly more so than subjects in each of the other conditions ($P < .01$ in each case), while the latter did not differ from one another.

Direct influence

This concerns the estimations of the lines averaging 20 cm which were presented during the experimental phase (see Table 1), subjects having been confronted with a source giving estimations which averaged 9 cm. A 2 x 2 analysis revealed two main effects. First of all, subjects who supposed themselves to be incompetent gave estimates closer to those of the source (m = 19.81) than subjects who imagined themselves to be competent (m = 23.44; F1/108 = 6.323, $P < .02$). Secondly, the competent source induced shorter estimates (m = 19.68) than the incompetent source (m = 23.64; F1/108 = 7.460, $P < .01$). Comparison between the experimental conditions and the control condition (m = 24.96) clearly indicates a direct influence of the competent source on incompetent subjects (t/129 = 3.349, $P < .001$), but no such influence of an incompetent source on competent subjects. The two other conditions reveal only a tendency in the direction of such an influence effect ($.05 < p < .10$; one-tailed).

subjects:	incompetent		competent		–
source:	incompetent	competent	incompetent	competent	–
n	28	28	27	29	22 (control)
direct influence	**21.92**	**17.70**	**25.42**	**21.59**	**24.96**
SD	5.71	7.16	10.74	6.82	6.55
lower scores indicate more direct influence					
indirect influence	**7.90**	**6.72**	**6.91**	**7.31**	**6.76**
SD	2.30	1.21	1.17	1.30	1.83
higher scores indicate more indirect influence					

Table 1 : Mean length estimations (in cm) of the 20 cm lines during the influence phase (direct influence) and mean length of drawings of the 8 cm line (indirect influence).

Indirect influence

This is reflected in the length of the drawings made of the 8 cm line (see table 1), influence of the source corresponding to drawings of greater length. The 2 x 2 analysis revealed a significant interaction (F1/108 = 7.096, $p < .01$). The contrasts indicate that incompetent subjects confronted with an incompetent source produced lines which differed significantly in length from those produced by subjects in all the other conditions. The incompetent source had more influence on incompetent subjects (m = 7.90) than did the competent source (m = 6.72; t/129 = 2.727, $p < .01$), and more influence on these subjects than on those who were led to believe they were competent (m = 6.91, t/129 = 2.274, $p < .03$). The other conditions did not differ significantly from one another. Comparison of the experimental conditions with the control condition indicated that the only significant indirect influence was that of the incompetent source on the incompetent subjects (t/129 = 2.466, $p < .02$).
Let us note again that subjects' evaluations reflect a clear overestimation of the lengths, at least in the context considered here (see also Butera, Maggi *et al.*, 1996). This tendency was also found for the 8 cm line, the average length estimated being 8.92 cm (SD = 3.093), in distinct contrast to the drawn lines which averaged 7.05 cm (SD = 1.534), this difference being statistically significant (t/133 = 7.03, $p < .001$). These results, like those of Dasi, Pérez and Mugny (1996), indicate that the mental representation of the centimetre was shorter than that of the metric centimetre. The substantial underestimates made by the source were therefore clearly contrary to the subjects' own natural inclinations, and the modification anticipated in the case of constructivism involved a significant transformation in the "spontaneous" representation of the centimetre.

Discussion

This first experiment provides two sets of results, one more conventional the other more novel. At the level of direct influen-

ce (in this case estimations of length), the familiar effects of informational influence were obtained (Deutsch & Gerard, 1955). On the one hand, a more competent source has more influence than a less competent source (*cf.* French & Raven, 1959; Hovland, Janis & Kelley, 1953); on the other subjects who were labelled as having little competence were more influenced than those who were informed that they were more competent (Allen, 1965; Kelman, 1950; Rosenberg, 1963).

Influence measured in terms of the reproduced line revealed a quite different pattern of effects to those for the measure of direct influence. Here, subjects who were themselves identified as having little competence, when confronted with an equally incompetent source, undertook a genuine elaboration of the source's position. In this condition, concern about being wrong as a result of their own incompetence together with the lack of any possibility of relying on a source whose responses were also highly divergent from their own (these conditions defining a conflict of incompetences; *cf.* Butera & Mugny, 1995) led subjects to a validation of the source's position (Moscovici, 1980). This process went so far as to affect their representation of the centimetre itself, an outcome revealed in the exaggeration, relative to conditions comparable in other respects, of the length of a line drawn to represent a length of 8 cm.

Comparisons between the experimental conditions and the no-influence control condition demonstrate three types of influence dynamics which are typical of the processes potentially at work in aptitude tasks (*cf.* Mugny & Butera, 1995). We saw first of all that subjects who believed themselves to be competent were not significantly influenced relative to those in the control condition, and that this was the case for both direct and indirect influence (absence of conflict). In effect only the incompetent subjects revealed any inclination to take into account the other's response. Comparisons with the control condition show, however, that when the source is competent these subjects only display direct influence (informational dependence), but that when they are confronted with an incompetent source they are only susceptible to indirect influence (conflict of incompetences).

Experiment 2

This replication involved only two experimental conditions, all subjects being labelled, according to the criteria applied in the first experiment, as incompetent. This experiment addressed a question which arose from the first experiment concerning the logic that underlies the link between direct and indirect influence. This logic assumes that there is an indirect influence if subjects judge that a given line is shorter and in so doing infer that the centimetre is actually longer. One should therefore expect an inverse correlation between the estimation of lengths and the actual length of a drawing made of a line. The data from the first experiment were unsatisfactory from this point of view. The overall correlation was in fact positive ($r = +.11$) though not statistically significant. However, in the only condition in which it was significant, that in which incompetent subjects were confronted with a competent source, the relation was positive ($r = +.44$, $p < .05$), suggesting a kind of overgeneralisation in which these subjects tend to make their drawings shorter to the extent that they underestimated the lines.

Experiment 2 therefore introduced a measure which would be less susceptible to any such overgeneralisation. Subjects were asked, not to copy a length which was displayed to them visually, but to draw a length (the length given was 5 cm) purely on the basis of their own mental representation. In this case, subjects should be less dependent upon previous seen drawings of lines and estimations of these, and consequently less susceptible to be biased by a false generalisation, because they have to activate their own representation of the centimetre.

Method

Procedure

This experiment followed the procedure adopted in the first experiment in all respects except for a few details of material and measures, which will be described below.

Sample

A total of 57 subjects of both sexes participated. Their median age was 21 years.

Experimental design

The design involved the two conditions created in the first experiment which gave rise to influence, those in which subjects were led to believe they were incompetent on the basis of fictional scores awarded for their performance on the pre-test. Only the competence of the source was experimentally manipulated. Thus all subjects were informed they had scored 24 (on a 100-point scale), and they were told the responses of a person who had either mediocre (score of 24) or excellent abilities (score of 78).

Material

The stimuli used for the experimental phase averaged 10 cm in length (eight of 10 cm, two of 9 cm and two of 11 cm) rather

than 20 cm, and the source judged these on average to be 5 cm long (giving estimates of 5 cm eight times, 4 cm twice and 6 cm twice), and therefore again giving distinct underestimates overall.

Dependent variables

While direct influence was evaluated exactly as in experiment 1 (the average of the estimates given in the influence phase), indirect influence was different. At the end of the experiment the experimenter asked subjects to draw a line 5 cm long. This was intended to activate their own representations of the centimetre. Thus the average length of these drawings constituted the indirect influence measure.

Results

In this replication the measure of indirect influence this time corresponded entirely to the principle according to which lower estimates of a length will correspond to an elongated representation of the centimetre. The correlation obtained between the average of estimates in the experimental phase and the length of the line drawn to represent 5 cm was –.41 ($p < .01$). We are therefore able to confirm the dynamics of the influence process (see table 2).

Table 2 : Mean length estimations (in cm) of the 10 cm lines during the influence phase (direct influence) and mean length of drawings of the 5 cm line (indirect influence).

subjects:	incompetent	
source:	incompetent	competent
n	33	24
direct influence	**10.78**	**9.08**
SD	2.998	2.675
lower scores indicate more direct influence		
indirect influence	**5.57**	**4.92**
SD	1.615	1.377
higher scores indicate more indirect influence		

Direct influence

The subjects, who were all labelled as low in competence, gave estimations of the stimuli (which in reality averaged 10 cm) that were shorter when the source was competent (m = 9.08) than when the source was incompetent (m = 10.78; t/55 = 2.20, $p < .02$; one-tailed test).

Indirect influence

The drawings made to represent a line of 5 cm tended to be longer when subjects had been faced with an incompetent source (m = 5.57) than when they had been faced with a competent source (m = 4.92; t/55 = 1.60, $p < .06$; one-tailed test).

Discussion

The results in this study replicate those in the corresponding conditions in experiment 1. When the source is competent, non-competent subjects show more direct influence than when the source is incompetent. When this source is incompetent, they show more indirect influence than when the source is competent.

We would draw particular attention to the change made in substituting an alternative measure of indirect influence in the second experiment because it relates to a not unfamiliar problem in research on social influence, that of the relation between direct and indirect influence (*cf.* Mugny & Pérez, 1991). It concerns the relation between on the one side measures on which the source exerts pressure and for which change or resistance to change relate directly to acceptance or rejection of the source position, and on the other to measures capable of detecting more fundamental changes, indicating that a process of validation is operating (Moscovici, 1980). It turns out that indirect measures which are too explicitly linked to the source position have difficulty detecting latent dynamics because they are consequently too overtly associated with open conflict with the source (*cf.* Mackie, 1987). The problem therefore arises of finding an indirect measure which is not vulnerable to any simple "contamination" by direct influence (*cf.* Moscovici & Personnaz, 1980). Such contamination would in effect question the epistemological status of latent influence because such influence would constitute a simple extension of direct influence, lacking the character of any constructivist activity. Thus it is necessary that the relation between direct and indirect influence involves an inference on the part of the subject, even if this is implicit (*cf.* Mugny & Pérez, 1991), on which validation can have an impact.

In this context, the representation of the centimetre, reflected in the measured length of a graphic reproduction, has seemed to us an especially suitable means for detecting changes at the level of perceptual processes. As distinct from the direct measure where estimation of lengths is under the control of the motivation to move closer to or keep a distance from the source, the graphic reproduction proves to be less susceptible to control by conscious judgment and depends more on the subject's mental representation of the centimetre. In effect, the subject who is influenced by the source's underestimations but who by virtue

of the nature of the conflict does not want to yield at the overt level, can certainly resist in terms of manifest judgments but cannot control a reduction in his or her own mental representation of the centimetre to the same degree. This representation is affected by the inference made about the source's representation of the centimetre, revealed in this case by an increase in the length of the line the subject draws to represent a given length. Now, we have seen in the first experiment that although results were in the predicted direction, the relation between the estimates and the drawn line was not the inverse relationship we had expected. This absence of a correlation is probably attributable to the association between the two measures; the lower estimates of length to some degree contaminated the line drawing measure.

In this second study it seems we were successful in overcoming this limitation by asking subjects to produce a line of a given length in such a way that they had to draw upon their own representation of the centimetre, there being no model present to which they could refer while executing this task. The results show that the anticipated relation is then obtained, the correlation between the direct and indirect measures being negative and statistically significant (at least for subjects labelled as non-competent, the only condition considered in this replication). This measure therefore seems promising for future research using this type of paradigm, in that it can show the required relation with the direct measure (the more the length of a line is underestimated, the longer the representation of the unit of measurement, and thus the longer will be the drawing made to represent a length of a given number of those units of measurement), and is sensitive to the inference the subject makes about the source's representation of this same unit of measurement. The explicit or implicit nature of such an inference however needs to be the object of further research.

Conclusion

The two experiments provide useful clues for conceptualising the relation between manifest and latent social influence dynamics involved when the confrontation between target and source of influence is organised around relations of competence. Indeed these dynamics depend largely on the social comparison the subject makes of competences relative to the source. There can be little doubt that these two experiments do involve subjects in a task in which their abilities are involved because they are asked to give the most accurate response they can and they know that a correct response does exist even if they lack the means to determine precisely and what this is.

As predicted by Conflict Elaboration Theory (Pérez & Mugny, 1993; Mugny *et al.*, 1995), in a task of this type it is competence which constitutes the relevant dimension around which the dynamics of conflict are articulated, to the degree that subjects are motivated to evaluate themselves and evaluate the source as a function of the probability of producing the most accurate judgment. Thus the results of the first experiment reveal one of the dynamics: when subjects see themselves as competent neither their judgments nor their drawings differ significantly from those produced in a control condition and no influence is induced. In other terms, subjects who are reassured about their own level of competence do not elaborate the divergence as a conflict sufficient to produce any form of change. In contrast, when subjects suppose themselves not to be competent and therefore when uncertainty as to their capacity to perform the task is salient another dynamic is revealed: the nature of influence varies according to the competence of the source.

If the source is more competent than the subjects, the latter find themselves in a situation of informational dependence (Deutsch & Gerard, 1955). Thus, in the first experiment as in the second, subjects are more inclined to defer to the estimations given by the source which represent informational support. It is interesting to note that in the first experiment this is the only condition in which there was a positive correlation between the estimations and the drawing which suggests an undifferentiated application of the underestimation principle in a kind of "unwarranted generalisation" of the principle underlying the source's responses.

If the source is as incompetent as the subjects, the latter find themselves in a situation involving a conflict of incompetences (Butera & Mugny, 1995), subjects being able neither to adopt the incompetent source's response nor, by virtue of their own lack of competence in the matter, to reject it completely. The result is the absence of any direct influence but the occurrence of indirect influence, as was found in both the first and the second experiments. It is worth noting that in the first experiment, only in this condition was the drawn line significantly longer than in the control condition; it was thus the only condition to show an indirect influence. Subjects had therefore responded to the source's estimation by elaborating a representation of the centimetre closer to that which "logically" underlay the source's response, and as a result produced drawings of the line which were longer.

In conclusion the line of research developed in this article (*cf.* also Butera, Maggi *et al.*, 1996; Dasi *et al.*, 1996) addresses the problem of the role of information transfer in learning, a question which work in genetic social psychology has already raised with respect to the role of social interaction in children's cognitive development (Doise & Mugny, 1984). If it appears from this point of view that a "genuine" integration of the source's res-

ponse is produced when subjects consider themselves to be as lacking in competence as the source, it remains to be determined under what conditions the competence of the source (*cf.* Peterson & Nemeth, 1996), or that of the subject (*cf.* Chambres, 1995) are equally likely to induce an "adequate" elaboration of alternative information.

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