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Informational dependence and informational constraint : Social comparison and social influences in an anagram resolution task[1]

*Alain Quiamzade**
*Alexander Tomei**
*Fabrizio Butera***

Abstract :
In tasks where aptitudes are at stake, provided that the source of influence is of high competence and the target of low competence, targets submit to an "informational constraint" and merely imitate the source's responses with no further cognitive activity. In this situation, the high competence of the source is perceived by the targets as a threat to their own competence. In regard to this kind of task, the recent evolution of Conflict Elaboration Theory (CET) suggests that this mere imitation may be thwarted in order to achieve a process of " informational dependence " which leads to constructivism. In the first study (N = 105), we manipulated the perceived threat of the source's low vs high competence. Respondents were led to compare their own competence to those of the

Résumé :
Dans les tâches où les aptitudes sont en jeu, lorsque la compétence de la source est élevée et celle de la cible basse, la cible se soumet à "une contrainte informationnelle" exercée par la source, et imite ses réponses sans autre forme d'élaboration cognitive. Dans cette situation, la compétence de la source est perçue comme une menace par la cible pour sa compétence propre. La récente évolution de la théorie de l'élaboration du conflit (TEC) suggère que l'apparition de cette simple imitation peut être déjouée de façon à obtenir une "dépendance informationnelle" qui amène à du constructivisme. Dans une première étude (N = 105), la perception de la menace que représente une source de haute versus basse compétence a été manipulée. Les parti-

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*Faculté de Psychologie et des Sciences de l'Education
Psychologie Sociale
Université de Genève
40, bld du Pont d'Arve.
1205 Genève, Suisse.
**Laboratoire de Psychologie Sociale de Grenoble-Chambery
U.F.R. Sciences de l'Homme et de la Société
Université Pierre Mendes France BP 47
38040 Grenoble
Cedex 9 FRANCE

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source in either an independent mode or a negatively interdependent mode. The former led to constructivism instead of imitation when comparison was made with a competent source. The "conflict of incompetences", which CET predicts when the confrontation is with an incompetent source without threat, was not found in this study. In an attempt to explain this result, a second study (N = 88) was undertaken based on the hypothesis of an asymmetry of incompetences: It shows that the source's strategy is perceived as more elaborated than the target's one, even if the source is incompetent.

cipants étaient amenés à comparer leur compétence et celle de la source sur un mode négativement interdépendant versus indépendant. Avec une source compétente, la comparaison indépendante génère l'apparition de constructivisme en lieu et place de l'imitation. Le "conflit d'incompétences" – prédit par la TEC lorsque la confrontation se fait avec une source de basse compétence en absence de menace – n'apparaît pas. La seconde étude (N = 88) tente d'expliquer ce résultat sur la base d'une hypothèse d'asymétrie des incompétences : elle montre que dans le paradigme expérimental la stratégie de la source est perçue comme davantage élaborée que celle de la cible, même si la source est incompétente.

Introduction

Conflict Elaboration Theory (CET) claims that the study of social influence requires consideration of the subjective meaning given to divergencies in judgements (Mugny, Butera, Sanchez-Mazas & Pérez, 1995 ; Pérez & Mugny, 1993, 1996). One of the principal claims of this theory is that the different effects of influence depend on the nature of conflicts and on the target's representation both of its relation with the source of influence and of the nature of the task. In addition, the characteristics of the source perceived as most relevant may vary depending on the nature of the task.

Thus, when a difference in judgements occurs for a task that involves individual's aptitudes (aptitude tasks : *c.f.* Mugny & Butera, 1995 ; Mugny, Butera, Quiamzade, Dragulescu & Tomei, in press ; Quiamzade, Falomir, Mugny & Butera, 1999), such as for instance problem solving tasks, competence becomes the relevant characteristic of the source. In fact, in this kind of task, the individual is uncertain about the correct outcome of the task : he knows that there is a right or more valid answer but has no means determining what it is. Hence, the target is placed in a situation of informational dependence on the source (Deutsch & Gerard, 1955). It follows that the target derives from the source's perceived competence the chances that the source is likely to hold the correct solution to the task.

In several experimental studies, Nemeth (1986) has employed tasks involving aptitudes. This author argues that different influence mechanisms will be involved as a function of the stress experienced (Nemeth & Wachtler, 1983) and of the source's status (majority vs. minority). Moscovici (1980) for his part claims that, depending on the source's status, the attention of the individual may be differently oriented. When the target is faced with a minority, which is generally considered as being wrong, the target's attention is more problem-oriented, meaning that the problem is analysed more deeply and solutions are supplied with a greater number of new elements and perspectives. Despite the fact that minorities are considered to be wrong, their responses may be considered as possibly correct. According to Nemeth, in this case stress may facilitate the solution of the task. The target's thought is characterised "divergent thinking" that permits consideration of several perspectives and thus achievement of a higher level of performance (Nemeth & Kwan, 1987) or a higher degree of creativity (Nemeth & Kwan, 1985). When the target is confronted with a majority, it tends merely to take into account the response of the source. The thought of the target is then characterised by "convergent thinking" ; because of the stress experienced, the target examines the situation by considering only the point of view of the majority and not any other possibilities. Unlike Moscovici (1980), Nemeth suggest that individuals who encounter a majority take into account the responses of the source concerning the solution of the task. Stress, brought about by the divergence between the target's and the source's points of views, leads the individual to focus attention upon central elements of the task – the response of the source – and conse-

quently to neglect other more peripheral elements of the task (Nemeth, Mosier & Chiles, 1992).

Nemeth explains the differences in the influence mechanisms in terms of two principles. The first principle states that majorities and minorities produce different sorts of stresses and focus the target on different aspects of the task. The second principle posits that these differences concerning stress are connected to the validity ascribed by the target to the source of influence. The research reported in this paper takes these two principles as its starting point.

Concerning the first principle, we may suppose that stress is not intrinsic to the majority or minority status of the source. It may depend on the type of social comparison that occurs between target and source. When facing a majority that is believed to be correct, a divergence of view points leads the individual to conclude that he or she is wrong. This situation is felt as a threat to the target's self-image of competence. Uncertainty places targets in a position of informational constraint which drives them to adopt the source's position. In other words, it is because the social comparison with the majority is threatening that the target focuses on the relation between them. On the other hand, when faced with a minority, social comparison is not threatening : the minority is perceived to be as wrong as the target himself. Therefore, in this case, a divergence of viewpoints from the source is not detrimental. The target can then focus on the task and on the response of the source instead of focusing exclusively on the relationship with the latter. Accordingly, what allows the target to solve the conflict is not simply the majority or minority character of the source but the nature of the threat posed by the source in the social comparison processes. In short, we may propose that the effects of majority versus minority sources which are found for aptitude tasks are due to the fact that comparison with a majority is threatening for the competence of the target, whereas comparison with a minority is not.

Regarding the second principle, when the solution to a task relies on a social situation rather than on a physical certitude (Festinger, 1950, 1954), a belief is correct and valid so long as it is anchored in a group regarded as credible. Under these conditions individuals will refer to the consensus to validate their position. In other words, in a situation where uncertainty is increased by disagreement with the source, the target faces a lack of information which leads it to compare its probable accuracy with that of the source. The influence of the majority relies on the fact that, in terms of credibility, majorities possess greater socio-psychological resources than targets. The target adopts the position of the majority because consensus is a criterion of certitude. The majority is attributed a competence that is not accorded to a minority. Accordingly, it is not the numerical support of the source that counts in the solution of the task but rather its supposed credibility due to its competence. For these reasons, influence processes and mechanisms depend on the degrees of competence of the source.

According to CET, individuals who perform a task alongside others are motivated to compare themselves with these others in order to verify their own level of competence (Goethals & Darley, 1977) and their capacity (or incapacity) to accomplish the task (Bandura, 1986 ; Cantor, 1994 ; Wheeler, Martin & Suls, 1997). The elaboration of conflicts that stem from divergence may have different outcomes depending on the competence relations involved (*c.f.* Butera, Gardair, Maggi & Mugny, 1998 ; Maggi, Butera & Mugny, 1996).

Conflict with a high competence source is elaborated on a relational basis and its outcome is imitation. In fact, in situation where abilities are evaluated (Thornton & Arrowood, 1966), imitation of a high competence source confers some validity on the response of the target. Since the target is led to suppose that the competent source is closer to the correct answer than itself, the response of the source is adopted with a view to attaining the correct solution ; moving closer to the answer of a competent source amounts to an increase in one's own competence. Comparison with a high competence source produces a negative evaluation of one's own competence and a decrease in self-esteem (Morse & Gergen, 1970 ; Brickman & Bulman, 1977). Hence, adoption of the source's position allows the target both to satisfy its need to ameliorate its competence (Major, Testa & Bylsma, 1991) and to inhibit a social comparison that could be detrimental to the evaluation of its own competence. These two motivations to compare oneself with a competent source (*c.f.* Collins, 1996) may produce two different kinds of result, namely informational dependence and informational constraint. On one hand, the source's response is taken into account as an informational contribution. The target perceives no threat to its competence since the response

of the source would be needed to increase its own competence. In this upward comparison (Festinger, 1954), the response of the source would not merely be imitated but even integrated by target. This integration would lead to a true process of apprenticeship and constructivism. The individual would be more motivated to enhance his competence than to avoid a negative evaluation and a decrease of self-esteem. This is what we can strictly call *informational dependence* (Quiamzade *et al.*, 1999). On the other hand, if the response of the source is perceived as a threat to the target's competence, the latter imitates the response of the source in order to reduce the threat. In this case, resolution of the conflict is purely relational and more extensive processing of the task is not needed. This, in contrast may be described as *informational constraint* (*c.f.* Mugny, Tafani, Butera & Pigière, 1998).

Accordingly, if the higher competence of the source induces a threat to the target's competence, the induction of a less threatening social comparison should divert the target from a relational resolution of the conflict. This would allow a process of informational dependence instead of a process of informational constraint. As shown by Mugny, Moliner and Flament (1997), a change based on appropriation of information may occur even if there is no social comparison conflict. In other words, by avoiding focus on the comparison between competences, the target's attention should be diverted from the evaluative aspect of its competence to the solution of the task itself and hence to the increase in its own abilities through this solution.

As far as a low competence source is concerned, the conflict is generally of a socio-cognitive nature. In the first place, the target remains aloof from the position of the source. The target refuses to imitate the source in order to avoid adopting a potentially invalid solution. The low competence source is perceived as probably wrong so that adopting its solution increases the probability of being wrong oneself. This situation corresponds to a *conflict of incompetences* (Butera & Mugny, 1995 ; Maggi *et al.*, 1996) ; beyond the fact that both target and source are probably wrong, the latter's solution provides no information about the correctness of the former. In other words, the fact that the source gets it wrong does not mean that the target is right. Therefore, the target is placed in a situation of fear of invalidity (Kruglanski & Mayeseless, 1987). Since what is at stake in this kind of task is to affirm one's own competence by giving the

correct answer (Pérez & Mugny, 1993), fear of invalidity motivates the individual to examine more intensely the properties of the task. In this situation, searching for the solution implies that the individual decentres from his own point of view. In sum, the target focusses on the task, on its content and on the response of the source. If we recognise that the low competence source poses no threat to the target since no relation of superiority exists between them, then it should be possible to counteract constructivism by changing the nature of the social comparison so that the source may be perceived as threatening. This could be the case in a situation where a competitive relation drives the individual to affirm his superiority over the source (Butera & Mugny, 1995).

So far, we may propose that when there is a conjunction between the high competence of a source and the feeling of an intense threat produced by a restricting social comparison (informational constraint), the target is driven to adopt a convergent thinking mode and to imitate without integrating behaviour. Furthermore, since convergence is due to the threat that the source represents and not its nature, we should expect that the reduction of this threat by a less restricting social comparison (informational dependence) will allow the target to avoid a competence-based conflict. This would allow a focus of attention upon the task and solution of the conflict by a decentration process (Butera, Huguet, Mugny & Pérez, 1994) or by a co-ordination of points of view (Doise & Mugny, 1984), thereby integrating the source's position.

When a low competence source is accompanied by a non-threatening social comparison, the target may give way to a decentration and a process of validation. In practice, since the source is of low competence, the target should keep a distance from it. But the weakness of the comparison with the source would allow the target cognitively to elaborate the position of the source. In sum, a non-detrimental social comparison should legitimise decentration from one's own point of view and integration of the other's.

To test these hypotheses, we employed a procedure similar to that used by Nemeth and Kwan (1987). In their study, groups of four participants were asked to name the first three letters from a series of five letter-word strings. Three of the five letters were capitalised and formed a word both in the sequence they

were written and in the reverse order (*e.g.*, DOG). Each string of letters was shown on a slide for half a second in order to induce the participants to answer with the forward sequence (DOG in the example). Respondents were then given bogus feedback purporting to be the responses of the four participants. In one condition, this feedback indicated that the majority (three of the four participants) wrote down the words formed when the sequence was reversed, whereas, in another condition, the reverse sequence was attributed to a minority (one participant out of the four). Thus, the participants were confronted either with a majority or a minority using a sequence opposite to their own. Subsequently, the participants were asked to write down every word they could make from a series of 10 letters strings. The measures of influence that we define as imitation and constructivism correspond to those Nemeth and Kwan (1987) described as, respectively, the use of the source's strategy and use of a mixed strategy (*c.f. infra*). The mixed strategy may be defined as constructivism since it corresponds to two possible mechanisms. The first of these is decentration (Butera, Mugny, Legrenzi & Pérez, 1996), which leads the individual to abandon a single position and to consider alternatives options. The second mechanism is the co-ordination of points of view (Doise & Mugny, 1984), which leads the individual to integrate his point of view with the other's to solve the task.

Study 1

Method

Participants

A hundred and eighteen respondents, recruited in the halls of the University of Geneva, agreed to take part in a "a study concerning linguistic abilities in anagram resolution". The study was held in French and participants were tested individually. Due to problems of language and misunderstanding of instructions, thirteen participants were eliminated. Thus, the data from 105 participants (48 males, 56 females and one for whom this information was missing) were retained for analysis. Participants were aged 14 to 62 (median age = 22 ; M = 23.53 ; SD = 6.75) and 90 % of them were aged 19 to 27.

Procedure and experimental design

Participants were given a series of 5 strings consisting of 5 letters and were asked, for each string, to write down the first 3-letter French word they saw. In order to ensure a divergence from the reverse sequencing source, we needed the participants to write down words in the forward sequence. To make this likely, each string of letters was displayed in such a way that 3-letter words could be easily distinguished ; 3 letters were slightly separated from the other two letters in the string (*c.f.* table 1). In addition, each string of letters was hidden by a removable sticker in order to oblige the respondents to go through the task in a first-to-last order and thereby avoid anticipation. Finally, the participants were put under time pressure. The experimenter started a chronometer to time respondent's performance in solving the five letter strings (M = 48.7 seconds, SD = 34.5 seconds). It appeared that 84 % of the words given by the respondents were written down from the forward sequence (M = 4.20 words for the 5 strings ; SD = 1.05 words)

	String of letters	*forward sequence*	*reverse sequence*
Item 1	f cas i	Cas	Sac
Item 2	tri tn	Tri	Tir
Item 3	r les p	Les	Sel
Item 4	m car i	Car	Ira
Item 5	iu que	Que	Qui

Table 1 : Strings of letters and corresponding words in the forward and reverse sequences

Once the first response sheet was collected, the participants were informed that the task they had performed was typical of the game of Scrabble. They were then given the responses of a fictitious person (the source of influence) whose competence was manipulated by being presented either as an expert (high competence) or a beginner (low competence) at Scrabble[2]. More specifically, for half the participants the source was presented as "a member of a Scrabble club, an expert who regularly plays in international tournaments", whereas for the other half the source was presented as "a member of a Scrabble club, a beginner who just started to play". The source was intended to be

[2] Scrabble is a popular game which consists in discovering words from strings of 7 letters.

perceived as consistent (Moscovici, 1979) in reverse sequencing, in contrast to the participants[3].

Following the information about the source, the participants evaluated the competence of the source and their own competence for the 5 string task. The participants were asked to allocate points to the source and to themselves on four attributes, namely *competence*, *qualification*, *skill* and *expertise*. Distribution of these points was either negatively interdependent or independent (see Butera & Mugny, 1995). The negative interdependence condition required that a total of 100 points be shared between the source and the participant (what is given to one is denied to the other). This kind of sharing is therefore threatening and the social comparison corresponds to a competition. In the independent condition participants attributed 0 to 100 points to the source and another 0 to 100 points to themselves. This kind of sharing is not threatening and is not competitive. This double evaluation allows induction of social comparison. Finally, the participants were shown a 10-letter anagram (CREIUTNALB) and were asked to write down every word they could make from the 10 letters. To create the impression that a large number of words could be found from the anagram, participants were given a sheet of paper with sixty spaces (actually, more than one hundred French words may be found from this anagram). Performance was timed and respondents were given 3 minutes to carry out the task.

The study involved a 2x2 factorial design with source competence (high *vs.* low) and mode of social comparison (negative interdependence *vs.* independence) as the two independent variables.

Dependent variables

To assess social comparison, we computed the mean score of the four characteristics both for the competence of the source and that of the target (*c.f.* results for the reliability coefficient).

Concerning the 10 letter anagram task (CREIUTNALB), responses were coded for the total number of words written down, the number of correct words and the number of words using each of the three possible strategies (*c.f.* Nemeth & Kwan, 1987) :

a) forward sequence (for example CRI) which is the strategy the participants employed in the first task.

b) reverse sequence (for example BANC) which is the source's strategy. The employment of this strategy indicates degree of imitation of the source's strategy.

c) mixed sequence (for example NATURE) which indicated co-ordination between one's own strategy and that of the source. We defined this as a measure of constructivism.

For each strategy, we computed the proportions (number of words divided the total number of words written down).

In this study, the mixed sequence corresponds to a constructivist strategy since it consists in decentring from both the source's and the target's strategy and in co-ordinating the one with the other. Thus, as an additional measure, we also calculated the number of letters used in the mixed strategy words.

[3] As pointed out by one of the reviewers, two of the five strings of letters presented a technical defect. Since one of the main dependent variables consisted in the number of mixed words (indicating the integration of both the target's and the source's points of view), an essential condition was that respondents should not attribute mixed strategy responses to the source. Now, mixed strategy words could also be composed from strings 2 and 5 (see table 1), which constituted a bias. In response to the reviewer, an additional study was conducted in order to test whether the responses of the source were actually perceived as reverse sequence responses and not as forward or mixed sequence responses. In one condition, participants were presented with both the five strings of letters and the response of the source. They were then given three additional strings and were asked to (a) predict the responses that the source was likely to furnish itself and (b) point out the letters the source would have used. These additional strings presented the same structure as strings 2 and 5 (table 1) in the sense that the words given by the source could be formed either from a mixed sequence or from a reverse sequence. In the control study only one word was possible from of the string (VFIVQ giving the word VIF ; OWIOF giving the word FOI ; LTIHL giving the word LIT). If respondents did not infer the response of the source on the basis of these responses, then they should furnish as many words from the mixed sequence as from the reverse sequence. It appeared that the respondents (N = 21) indicated the letters that corresponded to the reverse sequence for 2.71 strings of 3 (SD = 0.64), which is significantly different from chance (t (20) = 8.65 ; p < 0.001). In another condition, respondent were first shown 5 strings implying necessarily the use of letters from the reverse sequence (strings 1, 3, and 4 of table 1, plus strings BRITN and IULOT replacing strings 2 and 5 of table 1), and then indicated what would be the response of the source for the 3 strings. Analysis revealed no difference between the response for the three strings and response in the first condition (N = 17 ; M. = 2.94 ; s = 0.24 ; F (1, 36) = 1.89 ; n.s.). This confirms that respondents actually perceived the source as consistently employing the reverse sequence strategy to solve the task.

Operational hypotheses

Hypothesis 1. Confronted with an expert source in a situation of interdependence, the participants should (a) converge more towards the position of the expert and thus make more use of the source's strategy (reverse sequence) than in the other conditions, (b) under-employ the mixed strategy as compared with the other conditions, (c) produce a lower number of words all together and (d) furnish mixed sequence words with fewer letters than in the other conditions.

Hypothesis 2. Faced with a beginner source in a situation involving independent distribution of points, participants should focus on the task more and therefore (a) show less imitation of the source, (b) make greater use of the mixed strategy, (c) produce a larger number of words all together and (d) furnish mixed sequence words with larger numbers of letters than in the other conditions.

Results

Age control

Because of age heterogeneity of the sample (14 to 62 years) and because age differences may determine perception of competence, an ANOVA was performed to verify any possible difference between the conditions. No significant differences were found between conditions.

Social comparison

The points allocated for the four competence attributes (competence, qualification, skill and expertise) were merged in order to obtain one index for the source competence and one for the competence of the participant[4] (Cronbach a = 0.81 and 0.85 respectively). Results are summarised in table 2.

[4] The points attributed respectively to the source and to the self were transformed into relative percentages, that is the points ascribed to the source and to self as proportions of the total number of points allocated. These percentages are reported in brackets in table 2. Results obtained with this method do not differ from those obtained with the non-transformed means method (except for the social comparison effect) in which the means represent the rates that are actually assigned by the respondents.

A 2 (high *vs.* low competence of the source) x 2 (interdependent *vs.* dependent social comparison) x 2 (points allocated to the source *vs.* points allocated to self) ANOVA was performed, the latter factor being within-subject.

This analysis produced three effects (*c.f.* table 2). First, a main effect of social comparison revealed that the respondents ascribed more points in the independence mode (M = 132.96) than in the interdependence mode (M = 100 ; $F(1, 101)$ = 46.58 ; $p < 0.001$). This can be simply explained by the fact that in the first condition respondents had a total of 200 points to share, while in the latter only 100 points were at their disposal for the distribution. Therefore, this effect will not be discussed further.

However, a main effect of point allocation revealed that the respondents gave more points to the source (M = 69.00) than to themselves (M = 47.64 ; $F(1, 101)$ = 76.49 ; $p < 0.001$).

Finally, more interestingly, an interaction of source competence x points allocation emerged ($F(1, 101)$ = 6.27 ; $p < 0.02$). Contrasts indicated that the respondents allocated more points to the expert (M = 72.87) than to the beginner (M = 65.05 ; $F(1, 101)$ = 4.95 ; $p < 0.03$), but did vary the points they awarded to themselves whether they faced the expert (M = 45.48) or the beginner (M = 49.84 ; $F(1, 101)$ = 1.18 ; *n.s.*).

	High competence		Low competence	
	Interdependence	Independence	Interdependence	Independence
N	26	27	26	26
Source	64.09	81.33	55.34	74.76
SD	12.12	21.39	9.6	16.39
%	(64.09%)	(59.79%)	(55.34%)	(57.61%)
Self	35.91	54.69	44.66	55.02
SD	12.12	23.29	9.65	26.50
%	(35.91%)	(40.21%)	(44.66%)	(42.39%)

Table 2 : Means of points allocated by participants to themselves and to the source

Concerning the independence conditions, the correlation between competence ascribed to the beginner and competence ascribed to self was positive and significant ($r(24)$ = 0.69 ; $p < 0.001$), while the correlation between competence attributed to the expert and competence attributed to self was non-significant ($r(25)$ = -0.14). Differences between these two correlations were significant (Z = 3.43, $p < 0.001$). As regards the interdependence conditions, the respective point distributions were necessarily perfectly negatively correlated.

Anagram solution

Number of words

Overall, the respondents generated a high proportion of correct words (92.4 % ; $M = 14.79$; $SD = 6.19$). Hypotheses 1 (c) and 2 (c) were not confirmed since there was no effect for this index.

Strategies

For each of the three strategies (forward, reverse, and mixed), we counted the number of words corresponding to each as a proportion to the total amount of words provided. Since most of the words were correct (92.4 %) and since no difference appeared between conditions concerning both the number of wrong words and the number of correct words, analyses were conducted for the entire set of words.

ANOVA were carried out for each of the three strategies. There was no experimental effect for forward sequence words.

Concerning the reverse sequence words, two effects appeared (*c.f.* figure 1). First, there was a main effect of social comparison ; respondents used the reverse strategy less under conditions of independence ($M = 0.18$) than they did in the interdependence conditions ($M = 0.24$; $F\ (1,101) = 4.19$, $p < 0.05$). Second, there was a marginally significant effect of the source ; respondent faced with an expert used the source strategy more ($M = 0.23$) than did those faced with a beginner ($M = 0.19$; $F\ (1,101) = 2.95$, $p < 0.09$).

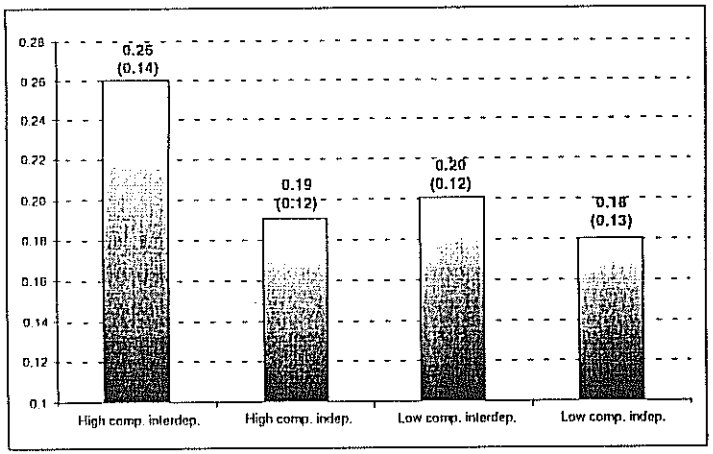

Figure 1 : Proportion of words furnished from the reverse strategy (standart deviations in parenthesis)

Consistent with hypothesis 1 (a), contrast analyses indicated that respondents in the Expert-Interdependent condition used the strategy of the source more than did those in the Beginner-Interdependent condition ($t\ (101) = 2.14$, $p < 0.02$, one-tailed) or those in the Expert-Independent condition ($t\ (101) = 2.38$, $p < 0.01$, one-tailed). No other significant differences emerged between the conditions.

Correlation analysis permitted identification of an important feature of the results. It appeared that when participants faced the expert under conditions of independence, the means concerning the self-attribution of points marginally correlated with the proportion of words based on the reverse strategy ($r\ (25) = 0.33$; $p < 0.09$). In other words, the more they imitated the expert the more they rated themselves as competent. This correlation did not occur in the condition of interdependent comparison.

Concerning the mixed strategy, a marginal main effect of the source was obtained (*c.f.* figure 2). The source presented as a beginner induced a higher proportion of mixed words ($M = 0.70$) than the source presented as an expert ($M = 0.64$; $F\ (1, 101) = 2.99$, $p < 0.07$).

To test hypothesis 1 (b), contrasts were carried out between the Expert-Interdependent condition and the comparable conditions. Consistent with hypothesis 1 (b), it appeared that the mixed strategy was used less by participants in the Expert -Interdependent condition than by those in the Expert - Independent condition ($t\ (101) = 1.79$; $p < 0.04$, one-tailed), or those in the Beginner source-Interdependent condition ($t\ (101) = 1.95$; $p < 0.03$, one-tailed).

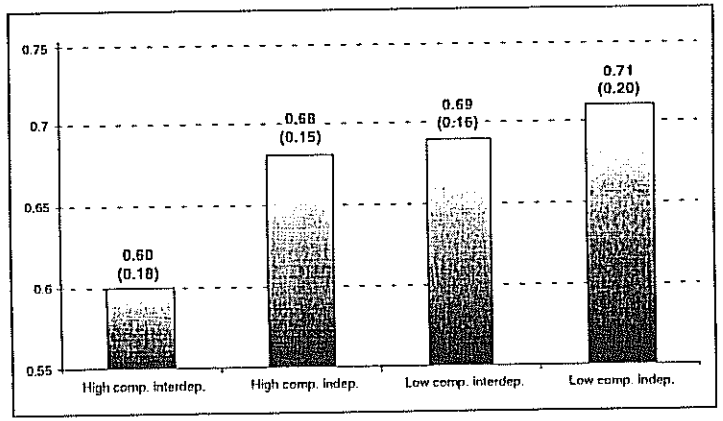

Figure 2 : Proportion of words based on the mixed strategy (standart deviations in parenthesis)

In the Beginner-Independent condition, the use of the mixed strategy was positively correlated with ratings of the source's competence (r (24) = 0.48 ; $p < 0.02$). That is, the more competent they rated the beginner, the more they generated words based on a mixed strategy. Another positive correlation was obtained between the number of mixed strategy words and the points attributed to self (r (24) = 0.41 ; $p < 0.04$) ; the more competent participants perceived themselves to be the more they generated words based on the mixed strategy. These correlations did not emerge in the Beginner-Interdependent condition.

Finally, with regard to the number of letters in the mixed words, a marginal main effect of the source was found (F (1, 101) = 3.06, $p < 0.09$) ; confrontation with a beginner led to generation of longer mixed words (M = 4.26, SD = 0.36) than confrontation with an expert (M = 4.13, SD = 0.42). Inconsistent with hypothesis 1 (d) and 2 (d), differences appeared only between the conditions involving threatening social comparisons; a high competence source induced shorter mixed words (M = 4.08, SD = 0.45) than did a low competence source (M = 4.30, SD = 0.27 ; t (41.3) = 2.18 ; $p < 0.04$).

Discussion

These findings indicate that imitation is strongest when the relation between the target and a high competence source involves a constraining social comparison. Moreover, these results seem to be consistent with the distinction between informational constraint and informational dependence. The distribution of points revealed that the individuals rated their own competence as lower than that of the expert source regardless of the threat posed by social comparison. However, a social comparison that is threatening (interdependent comparison) leads to imitation without any cognitive investment ; in this situation, imitation is the greatest while constructivism is the least. These are the features of informational constraint.

When the relation between target and source involves an independent social comparison, imitation is lower compared to the negative interdependence condition, but constructivism seems to be greater. Despite the fact that in this condition imitation is low, correlations between self-competence ratings and degree of imitation corroborate the fact that the individual is concerned with informational dependence : the higher the targets rate their own competence, the greater their imitation of the source's strategy. In other words, self-competence relies on the competence of the source. As the comparison is not threatening, the target is not forced to imitate the source to the detriment of its own competence. The target appropriates and transfers the competence of the source which results in the highest degrees of constructivism compared to the conditions in which the comparison is constraining.

Concerning the constructivism induced by a low competence source, findings show that the mixed strategy, as well as the number of letters in the mixed strategy words, is the outcome of being confronted with a low-competence source. However, concerning both the mixed strategy and the number of letters in the mixed strategy words, this constructivism does not depend on the relation between social comparison and source's competence. It seems that only the nature of the source regulates the dynamics underlying the two measures.

Unexpectedly, no conflict of incompetence appeared when participants were faced with a low competence source and were compared to it on an independent basis (low threat). Findings showed that in this condition participants rated the source as more competent than themselves. This may have no consequences for the high competence source conditions, but it appears to be a problem for the low competence source conditions. Although the respondents considered the high competence source as more competent compared to the low competence source, the latter was still perceived as more competent than themselves in all conditions. Yet a conflict of incompetences should occur when the competence of the source and of the target are perceived as equally low (Butera & Mugny, 1995 ; Maggi *et al.*, 1996). Even though, in this study, self-competence and source's competence are positively related, participants judged the beginner source as more competent than themselves. The context of the Scrabble game itself, in which the participants declare themselves as not competent (5-point scale : 1 = never play ; 5 = play very often ; M = 1.73, SD = 0.82, significantly different from the scale midpoint (=3), t (101) = 15.65 ; $p < 0.001$), creates an asymmetry of competencies that prevents occurrence of a conflict of incompetences.

We presume that the reverse sequence strategy of the source was probably perceived as more elaborated and original than the participants' own forward sequence. In effect the source may have been seen as giving more original responses than the targets. Forward sequence words are easier to write down than reverse sequence words. Since it is the more usual way of perceiving and using letters and words (it is what the majority of the participants did), reverse sequence may appear to the target to be the result of a more elaborate or "smarter" strategy.

Thus, the operationalization of the source's competence resulted in participants facing a high competence source in one set of conditions but a source which still appeared to be more competent that self in the others. This may explain the lack of differences between the two conditions that confronted the target with what was supposed to be a low competence source.

A second study was conducted to examine the connection between the type of strategy used by the source and the attribution of am higher competence to the low competence source than to oneself.

Study 2

Method

Sample

Ninety two gymnasium students from the Swiss canton of Vaud, aged 13 to 16 (median age = 14) served as participants in the experiment. Participants were 43 females and 49 males. Four participants were eliminated from data since they misunderstood the instructions and exceeded the 100 points limit in the conditions requiring interdependent distribution.

Procedure

Unlike study 1, in which some of the 3-letter words to be found were not formed by a block of three letters, in the present study each 3-letter word to be found occupied a central position between two other letters in the string. Each 3 letter block could be read both in the forward and the reverse sequence (*c.f.* table 3).

	String of letters	*forward sequence*	*reverse sequence*
Item 1	qt ces	Ces	Sec
Item 2	rit zn	Rit	Tir
Item 3	r sel p	Sel	Les
Item 4	m sac i	Sac	Cas
Item 5	iq nos	Nos	Son

Table 3 : Strings of letters and corresponding words in the forward and reverse sequences

The same procedure was used as for study 1, except for the fact that all the respondents confronted a beginner (low competence source). In addition, all participants compared themselves to the source under conditions of negative interdependence. This choice of the interdependent mode may seem inappropriate as we know that, in Butera & Mugny's (1995) study, the conflict of incompetences appeared when the individuals compared themselves to a low competence source under conditions of independence. Nevertheless, in Butera & Mugny's study the target and the source were placed in a situation of real divergence that ensured the creation of a conflict. In one condition in the present study, target and source used the same strategy, which should not create any divergence. Under these circumstances interdependent comparison should introduce a certain level of conflict.

The distribution of points was made either before or after solution of the anagram (depending on the condition). Since this factor had no effect on the point distribution variable, it requires no further consideration.

Experimental design

The strategy used by the beginner source was the only independent variable manipulated. For half the participants, the source responses for the 5 strings task were reverse sequences (as in study 1), whereas for the other half, the source responses were based on the forward sequence (the participants' strategy).

Operational hypothesis

Hypothesis 1. If we acknowledge that the reverse sequence strategy is perceived as more subtle and more complex than the

forward sequence strategy, then the source should be perceived as more competent when employing the former than when employing the latter to solve the task.

Hypothesis 2. Likewise, compared to the forward condition, the participants should perceive the source as more competent than themselves in the reverse condition.

Results

As in study 1, rates for the four competence attributes (competence, skill, qualification and expertise) were merged in order to obtain a single index for the perceived competence of the source and a similar index for self-competence (respectively Cronbach a = 0.87 and 0.87). Means are summarised in table 4.

Table 4 : Means of points participants allocated to themselves and to the source, and differences (higher numbers indicate higher competence to the self than to the source)

	Forward sequence	Reverse sequence
N	41	47
Self	52.27	44.92
SD	13.67	12.70
Source	47.73	55.08
Difference	4.54	-10.16

Consistent with hypothesis 1, a significant effect of the source's strategy was obtained indicating that the source was seen as more competent when using the reverse strategy (M = 55.08) than when using the forward strategy (M = 47.73 ; F (1, 83)[5] = 6.82 ; $p < 0.02$).

Consistent with hypothesis 2, an ANOVA[6] on the difference between points attributed to the source and points attributed to the self revealed that the source was perceived as significantly more competent than the self when the former used the reverse strategy (t (46) = 2.74 ; $p < 0.009$). This is not the case when the source employs the forward strategy (t (40) = 1.07 ; $p < 0.293$).

[5] Since one participant omitted to respond to one of the four comparison items, their mean score on the four items could not be calculated. Yet the same participant performed the rest of the task correctly, and thus his responses to the other dependent variables were retained for the analyses.

[6] A reapeated measures ANOVA as in study 1 (cf. supra) was judged useless here. In all conditions interdependence means that the points given to the source are entirely determined by the points given to oneself and vice versa.

However, in these latter conditions participants did not attribute more points to themselves than to the source.

Responses to questions regarding the representation of the task[7] supported these findings ; a main effect of the strategy was obtained for the question "Did the responses of the other person surprise you ?" Participants declared they were more surprised about the source when the latter used the reverse strategy (M = 3.47) than when it used the same strategy as they did (M = 2.46 ; F (1, 84) = 8.30 ; $p < 0.005$). Likewise, for the question "Did the responses of the other person make you uncertain ?", participants declared themselves more uncertain when the source used the reverse strategy (M = 3.21) than when it used the same strategy as they did (M = 2.20 ; F (1, 84) = 5.612 ; $p < 0.02$).

In other words, the reverse strategy seemed to be perceived as more complex than the forward strategy and target attributed a larger degree of competence to the source that employed it.

Discussion

This second study shows clearly that the strategy of the source is perceived as more elaborate when the latter uses a reverse sequence. In fact, the point distribution task clearly showed that the reverse sequencing source was rated favourably despite the fact it was introduced as a beginner. This explains the fact that in study 1 participants saw the source as more competent than themselves.

The asymmetry between perception of self-competence and perception the source's competence disappears when the participant and the source both employ the same strategy. Similarity between target and source in the strategy used leads to a perception of similarity of competencies as well.

General discussion

In conclusion, findings from study 1 lead us to the view that the target's representations of the influence situation appear to be important in understanding social influence processes in

[7] Seven-point Lickert type scales (1 = strongly disagree ; 7 = strongly agree).

aptitude tasks. These representations depend on an articulation between the source's competence and the social comparison of competencies. In effect it appears that the conflict created by the divergence between the position of the target and that of the source is not a function of the absolute competence of the source but rather of the threat created by the comparison between competencies.

More specifically, it appears that the threat generally associated with high competence sources derives from an antagonistic form of comparison between source and target, namely a comparison that is negatively interdependent. It is actually in this condition that imitation is strongest and constructivism weakest. *Informational constraint* results in the target focussing on the strategy of the source without seeking any alternative strategy (in this case a mixed strategy).

When participants compare themselves to a high competence source under less threatening conditions (in this case, the independent mode), imitation of the source may be perceived as an informational contribution rather than a constraint. In this condition, correlation between self-competence and degree of imitation was positive (this was not the case when comparison was negatively interdependent). The correlation meant that participants acknowledged a comparability between their competence and that of the source. This is the case in a situation involving truly *informational dependence*, in which the information provided by the expert source does not conflict with the competence of the target. This leads to a higher degree of constructivism than in the case of a negatively interdependent relation.

On the basis of these results, we may observe that experts occupy a delicate position as social ideals. Comparison with a source is generally preferred when these are more competent than oneself (Wheeler, 1966), but not exceedingly so (Wheeler *et al.*, 1969). If experts assume a position which implies gross inferiority of the other, the knowledge they transmit is merely imitated without being integrated. Therefore, apprenticeship becomes impossible. In a situation involving informational constraint, targets focus on their self-esteem which is diminished by the restraining nature of the social comparison. To enhance their self-esteem they confine themselves to imitating the source (Mugny *et al.*, 1998).

In contrast, a possible compatibility between one's own competence and imitation of an expert source allows a reduction in the threat to one's identity, or in other terms a reduction in the difference between the perceived competencies. It follows that the target's attention is oriented toward a more involved analysis of the task itself instead of focusing on the relational conflict. It is when the individual worries less about relational conflicts that apprenticeship is possible. In this situation, individuals do not focus on the need to enhance self-esteem. Rather they are motivated to find the most accurate and most efficient response. No major perceived differences in competence appear when the situation of informational dependence allows an upward comparison with a source more competent than the individual himself. This should authorise the target to centre on the motivation to enhance its competence rather than on the motivation to enhance self-esteem.

It is equally important to note that the present findings confirm Nemeth's (1986) notion that convergent thinking (in this case the presence of imitation and the absence of alternative strategies) is induced by a source regarded as correct (a majority in Nemeth's work ; a source the competence of which was manipulated in this research). In addition, results from the first study are consistent with the view that high status sources provoke stress and this leads to convergent thinking. We may consider that high status sources are generally perceived as dangerous opponents. When targets compared themselves to the source under independent conditions, the threat decreased and convergent thinking was reduced. It seems that one may imitate without any direct repercussion for self-competence.

Results concerning the low competence source are less clear. Findings revealed that overall a low competence source induced less imitation and more constructivism, consistent with indications in the social psychology literature (Butera et al., 1998). Study 1 did not clarify whether the effects of the low competence source are precisely due to the elaboration of a conflict of incompetences. However, study 2 showed that the source's strategy in study 1 was perceived as more sophisticated and resulted in the source being accorded higher competence than the self. This asymmetry impeded the occurrence of a conflict of incompetences. Indeed, the results from the second study indicated that when the source and the target

employ the same strategy, differences between source's and target's competence are reduced to non-significance.

So far, the studies presented are still inadequate to explain two major issues concerning the nature of constructivism. First, the material we used indicated that constructivism arises from two mechanisms : the presence of innovation and / or the co-ordination of points of view (Doise & Mugny, 1984). In fact, the mixed strategy may be interpreted as an innovation in the sense that individuals use a new strategy that differs both from their own initial strategy and from the source's strategy. Nevertheless, if we allow that the forward and reverse strategies may be combined, then the mixed strategy may be taken to represent this combination. Thus the mixed strategy can be seen as a co-ordination between the target's and the source's strategies, or between the two points of view. It follows that we cannot determine whether the observed constructivism corresponds to a co-ordination of points of view or to an authentic innovation. The properties of the strategies do not allow a separation of these possibilities. Second, although the beginner source leads to constructivism, this appears to be true also for the expert source when social comparison is not threatening of threatening social comparison. Though our model (Quiamzade et al., 1999) predicts differences between situations involving informational dependence and conflicts of incompetences, we wonder whether the nature of these two types of constructivism is the same. We may speculate that the marginal difference between source conditions in their effects on the mixed word length suggests a possible difference between these two types of constructivism. Accordingly, further research is necessary to settle the question.

Overall, the aim of the present research was to show that, in tasks where aptitudes are at stake, the competence of a source of influence may become a threat for the target. The effect of the source is then to cause the target merely to imitate without further elaboration. Elaboration may be fostered by a high competence source if the latter is not perceived as a threat by the target. Whereas other studies have shown that a reduction in threat allows the target to appropriate information, even if initial representations are opposed (Mugny et al., 1998, and Mugny, Tafani, Falomir and Layat in the present volume), the present research shows that decrease in the threat may also induce a form of constructivism.

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