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People's knowledge about images*

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Abstract

Adult subjects were given a questionnaire containing short descriptions of classic imagery experiments and asked to predict what the typical outcomes of these experiments would be. A majority of subjects correctly predicted that imagery would have positive effects on learning of verbal material, and on spatial and deductive reasoning. Only a small number of subjects, however, predicted effects of mental practice on learning motor skills. Furthermore, very few subjects were capable of predicting results typically obtained in mental rotation experiments (viz., more time is required to accomplish greater amounts of rotation on images), mental scanning experiments (longer distances in images take longer to scan), and experiments demonstrating longer verification times for properties of objects in small-sized images. The extremely poor abilities of subjects to predict these results can hardly be accounted for by a 'tacit knowledge' hypothesis, since, assuming that knowledge of the relationships linking speed, time, and physical distance normally 'penetrates' image processing, in this case the consequence would be that such knowledge is likely to be used for making rather accurate predictions concerning these experimental situations.

Since the mid-1960s, a great deal of data has been collected by psychologists about images, their properties, and their effects on different types of cognitive

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activity (cf., e.g., Denis, 1979; Paivio, 1971; Shepard and Cooper, 1982). The point we will stress here is the very small degree of concern of scientific psychology with how people themselves consider imagery. It is a matter of fact that most people *have* representations of (at least some) mental processes and of the way these operate. Could it be the case that people *do* know the properties and functions of images that scientific psychology has established, without any direct access to the scientific data?

One might argue that this kind of 'metacognitive' approach to imagery is a purely speculative matter. Our claim is that this is *not* the case, and that we have to take account of what people other than scientists know (or believe) about imagery and of how sound this knowledge (or belief) may be. Not only is this a matter of general concern, as may be the case in any other field of psychology, but also it has taken on special significance since certain theorists have developed the idea that processes involved in mental imagery have to be considered from the angle of 'tacit knowledge'. According to this view, data from imagery experiments would essentially reflect people's knowledge of the laws governing the physical world rather than genuine properties of images themselves.

For instance, it has been argued that the function relating decision times to distance in mental scanning, or to the angle of rotation in mental rotation, only reflects people's knowledge about the relations between speed, time, and physical distance. In other words, people would proceed faster in checking 60° than 120° rotations simply because they simulate their witnessing of real rotations. Their tacit knowledge of the nature of physical rotations would be used to make mental rotations proceed as they believe them to proceed in reality (cf. Pylyshyn, 1979, 1981; see also Finke, 1980; Finke and Pinker, 1982; Kosslyn, 1980, 1981; Kosslyn and Folk, Reference note 1, as significant contributions to the 'imagery debate'). A convergent, although distinct, line of arguments stresses the idea that data from imagery experiments are likely to be contaminated by task demands, that is, that subjects tend to make their responses conform to what they think is expected of them (cf. Richman, Mitchell and Reznick, 1979).

These points certainly deserve a bit more attention. If imagery phenomena are nothing more than the reflection of some highly available tacit knowledge, then people should certainly be able to predict and/or give quite accurate accounts of their own imaginal processes on the basis of this knowledge. Anyone who knows the relationships between speed, time, and physical distance and whose cognitive functions are assumed to be 'penetrated' with such knowledge when he or she is actually performing a mental rotation task would be able to use at least a part of this knowledge to predict his or her own behavior *before* the experiment. Thus the tacit knowledge approach would assume that people exhibiting distance–time regularities in mental rotation (i.e., the vast majority of people) should be able to anticipate the outcome of the experiments they are participating in (or are likely to participate in). In short, it is reasonable to expect rather high percentages of people to venture a guess that angle of rotation determines decision times.

We have, however, little or no information on what subjects (or potential subjects) know about imagery phenomena. The present investigation was designed to throw some light on such knowledge. It consisted in presenting people with short descriptions of classic imagery experiments and asking them to say what the typical outcome of these experiments would be. Would people be good predictors of the regularities they (or their peers) usually exhibit? Or, on the other hand, for at least some questions, would people be unable to imagine the outcomes of experiments on the sole basis of available knowledge? A result of this type could scarcely be accounted for by a tacit knowledge hypothesis.

Method

Materials

We devised a 15-item questionnaire (see Table 1). The first question explored subjects' beliefs as to the ability of psychology to investigate mental images scientifically. Eleven of the questions which followed consisted of short descriptions of typical procedures used in imagery experiments (or experiments closely related to the issue of imagery, such as picture-word memory experiments). The questions consisted in predicting the outcome of the experiments described. No reference was made to specific authors of the experiments, and there was no mention of any name. In some cases (questions 3–7, 12), subjects were simply requested to decide between "Yes" and "No" as answers concerning the eventual outcome of the experiment described in the question; in other cases (questions 2, 9, 14, 15), subjects had to decide which of three possible outcomes was correct. One question (8) had to do with people's ability to visualize rotating objects. The three remaining questions (10, 11, 13) were of yet another kind, in the sense that they investigated subjects' agreement with theoretical interpretations of certain experimental results.

Among the questions which involved predictions of experimental results, six (2–7) dealt with experiments which investigated the effects of mental imagery on learning and reasoning, more specifically, experiments demonstrating (a) superiority of pictures over words in memorization (e.g., Denis, 1975; Paivio, Rogers and Smythe, 1968); (b) positive effects of instructions to image in learning word lists (e.g., Denis, 1975; Paivio and Yuille, 1967); (c) positive effects, on verbal learning, of imagery ability (e.g., Di Vesta and Ross, 1971; Ernest and Paivio, 1969); (d) positive effects of mental practice in learning motor skills (e.g., Mendoza and Wichman, 1978; Ryan and Simons, 1982); (e) effects of visualization on spatial reasoning (e.g., Frandsen and Holder, 1969); (f) effects of visualization on deductive reasoning (e.g., Shaver, Pierson and Lang, 1974–1975).

Four questions (9, 12, 14, 15) dealt with imagery experiments whose results have been frequently invoked as reflecting intrinsic (structural) properties of visual images, such as experiments investigating (a) the rate of mental rotation for a stimulus as a function of the angle of rotation (e.g., Cooper and Shepard, 1973); (b) duration of mental scanning as a function of the distance to be scanned (e.g., Kosslyn, Ball and Reiser, 1978); (c) and (d) time to check properties of objects as a function of the size of images (e.g., Kosslyn, 1975).

Procedure

Subjects were given printed instructions on how to complete the questionnaire they were about to receive. The instructions indicated that questions should be read one at a time, in the order in which they appeared, and that subjects should check the appropriate answers. In some cases, they would have to indicate "Yes" or "No", in other cases, one out of three possible responses. They were also instructed to rate the degree of certainty for each of their responses on a 5-point scale (by circling the appropriate number, from 1 to 5). Furthermore, they were instructed that if they did not wish to answer any of the questions, they should indicate whether (a) this was because they lacked the necessary information to answer, or (b) because they had as much reason to answer "Yes" as to answer "No". Subjects received question forms, which consisted of booklets with one question per page.[1]

[1]In fact, this phase was followed by a further experimental phase, which consisted in presenting subjects with a text describing imagery experiments and their actual results. After reading the text, subjects were requested to take the initial questionnaire over. Our purpose was to observe whether exposure of the subjects to descriptions of the experiments would lead them to modify their beliefs, in the case of questions that had not received correct answers initially. As regards questions correctly answered by subjects, variation in certainty ratings from the first to the second completions of the questionnaire was also examined. This part of the study constituted a preliminary step in a research program, the CINNA project, whose purpose is to elaborate computer-assisted procedures in which individualized texts in various scientific domains are constructed as a function of the initial states of knowledge of readers (cf. Le Ny and Denhière, 1982).

Subjects

A total of 148 subjects (34 male, 114 female) participated in the experiment. They were all students in psychology, registered as first-year students, and native speakers of French. Ninety-three of them came from the University of Paris VIII, and 55, from the University Paris-Nord, Villetaneuse. Participation was required during regular classes. The experiment was run for groups of 20 to 40 subjects. Inspection of data from the two populations did not reveal any significant differences between them. They were therefore combined into a single group.[2]

Results and discussion

Response patterns for each question are shown in Table 1. A clear-cut differentiation appeared between two groups of questions, that is, generally speaking, between the first half of the questionnaire (questions 2–7), and the second half (questions 8–15). In the first half, all the questions had in common the fact of calling for predictions concerning effects of imagery on various types of activity. For all but one of these questions, there were high rates of correct prediction, in some cases close to 90%. The best-predicted experimental findings were: superiority of memory for pictures over memory for words (question 2), positive effects of imagery instructions on verbal learning (question 3), and positive effects of such instructions on spatial reasoning (question 6). In the first two cases, the numbers of erroneous predictions and abstentions were somewhat low, but in the last case, there was an appreciable rate of abstention. Effects of imagery abilities on verbal learning (question 4) and effects of imagery on deductive reasoning (question 7) were predicted by relatively smaller numbers of subjects, although rates of prediction remained substantial in both cases, that is between 60 and 70%.

It is difficult to evaluate to what extent subjects relied on personal experience in making predictions. Nevertheless, there is a widespread belief that

[2]All the students composing the sample were at the start of their academic career and we made sure that at this stage in the curriculum, they had not yet received any academic instruction on the subject of mental imagery. Nevertheless, although we actually had good reasons for believing that these subjects were not likely to produce responses biased by their academic interests, we also examined a sample of subjects with advanced educational backgrounds in fields other than psychology (N = 64). Detailed inspection of the results from both samples revealed highly similar patterns of responses. Thus, it can be assumed that responses of students in psychology are not fundamentally biased by their academic origin, and that their knowledge about mental images does not differ to a large extent from the knowledge of other people.

Table 1. *Questions 1–15 and their response patterns (in percentages)*[a]

Question 1
Do you think psychology can investigate mental images scientifically?
(a) Yes: 54.1; (b) No: 13.5; (c) Abstention: 32.4.

⟨*Imagery and learning* (Questions 2–5)⟩

Question 2
When you ask a set of people to learn a list of concrete objects (or else pictures of such objects) and another set to learn a list of words designating these objects, which of the following results would you generally expect?
(a) Learning is better for individuals who have been shown the objects: 85.1;
(b) Learning is better for individuals who have been shown the words: 2.7;
(c) Learning is the same in both conditions: 8.8;
(d) Abstention: 3.4.

Question 3
Does forming visual images of the objects named in a list generally facilitate the learning of the list?
(a) Yes: 89.9; (b) No: 6.1; (c) Abstention: 4.1.

Question 4
Do people with special aptitudes for forming mental images generally have better scores in word memory tests than people with poor aptitudes for imagery?
(a) Yes: 62.8; (b) No: 18.2; (c) Abstention: 18.9.

Question 5
Are there cases in which simply imagining oneself carrying out a new motor skill is enough to be capable of executing this skill correctly later?
(a) Yes: 16.2; (b) No: 77.0; (c) Abstention: 6.8.

⟨*Imagery and reasoning* (Questions 6–7)⟩

Question 6
In general, when people have visualized the spatial relationships among objects being described to them, are they more capable of answering questions about the relative positions of these objects later?
(a) Yes: 71.6; (b) No: 7.4; (c) Abstention: 20.9.

Question 7
Is it generally the case that forming mental images helps in solving problems of logic?
(a) Yes: 66.2; (b) No: 13.5; (c) Abstention: 20.3.

⟨*Mental rotation* (Questions 8–11)⟩

Question 8
Generally, is it possible to visualize the rotation of an object in space?
(a) Yes: 76.4; (b) No: 9.5; (c) Abstention: 14.2.

Question 9
When people are asked to imagine an object rotating 60°, or the same object rotating 120°, which of the following is generally observed?
If it takes a given time to imagine a 60° rotation for one object …
(a) it takes longer to imagine a 120° rotation: 14.9;
(b) it takes less time to imagine a 120° rotation: 21.6;
(c) it takes the same time to imagine a 120° rotation: 40.5;
(d) Abstention: 23.0.

Table 1. *Questions 1–15 and their response patterns (in percentages)*[a] *(cont.)*

Question 10

When people imagine the rotation of an object in space, is it generally the case that the object is visualized as passing through all the intermediate positions?

(a) Yes: 24.3; (b) No: 54.1; (c) Abstention: 21.6.

Question 11

Can mental images be said to occur and to undergo transformations in a mental medium possessing the same properties as physical space?

(a) Yes: 13.5; (b) No: 33.8; (c) Abstention: 52.7.

⟨*Mental scanning* (Questions 12–13)⟩

Question 12

When people are asked to inspect a mental image, is it generally the case that the time it takes to scan between any two points is proportional to the distance to be scanned?

(a) Yes: 9.5; (b) No: 58.8; (c) Abstention: 31.8.

Question 13

Can the structure of mental images be said to reflect the spatial organization of the objects they refer to?

(a) Yes: 32.4; (b) No: 33.8; (c) Abstention: 33.8.

⟨*Verification of properties of objects in visual imagery* (Questions 14–15)⟩

Question 14

When people are asked to visualize a given object either in very large-sized or very small-sized images, and to verify whether a specific detail is present in each image, which of the following is generally observed?

(a) It takes longer to verify the presence of a detail in a very small-sized image: 23.0;
(b) It takes longer to verify the presence of a detail in a very large-sized image: 10.8;
(c) It takes the same time in both cases: 52.7;
(d) Abstention: 13.5.

Question 15

Suppose people are asked to visualize an object X beside a much larger-sized object Y. Or suppose these same people are asked to visualize the same object X beside a much smaller-sized object Z. In each case the subjects are asked to verify whether some specific detail is present in the image of the object X. Which of the following is generally observed?

(a) It takes longer to verify the presence of a detail in the image of X when X is beside Y: 18.9;
(b) It takes longer to verify the presence of a detail in the image of X when X is beside Z: 13.5;
(c) It takes the same time in both cases: 45:3;
(d) Abstention: 22.3.

[a]Original version in French. No headings appeared on the questionnaire administered to the subjects.

perceptual experience (question 2) and visualization (questions 3, 4, 6, and 7) are potent factors in learning and reasoning. Question 5, however, contrasted with all those mentioned above. The possibility that visualization might produce effects on motor learning was rejected by a majority of subjects, and quite low rates were observed here for such predictions. This result clearly shows how counterintuitive the idea is that motor skills may be affected by purely mental practice.

In the second half of the questionnaire, response patterns contrasted sharply with most of those reported above. Whereas a majority of people admitted that it was possible for visual images to represent rotating objects (question 8), there were, surprisingly, very few accurate predictions of a positive relationship between the angle of mental rotation and its duration (question 9). Similarly, a rather small number of subjects correctly predicted the relationship between duration of mental scanning and distance to be scanned (question 12).[3] In answering questions which called for interpretations rather than predictions, subjects on the whole were reluctant to agree with statements asserting the existence of structural similarity between imagery and perception (questions 10, 11, and 13). Finally, only a minority of subjects was capable of predicting that verification of properties of objects would take longer for smaller-sized images; the most frequent prediction was that of no relationship at all between subjective size of visual image and verification time (questions 14 and 15). Thus, on all questions concerned with hypothetical properties of the structure of visual images, subjects on the whole were poor predictors of standard findings, that is, that image processing exhibits time patterns similar to those observed for perceptual processing of real objects.

Clearly, subjects were much better at predicting positive effects of imagery on a number of activities (apart from motor activities) than they were at recognizing the fact that operations performed on images mimic operations involved in the perception of physical objects. Thus, images are known to be efficient aids in most types of cognitive activity, but their structure and the kinds of processing they may undergo are far from being considered as reflecting the structure of real objects and the processes that may actually be applied to external, spatially defined, stimuli. Finally, the assumption that, structur-

[3]This finding contrasts with data from "pseudoexperiments" by Richman, Mitchell and Reznick (1979), in which subjects apparently were capable of inferring that scanning times in image scanning experiments ought to show a linear relationship to the distances scanned. However, it may be the case that these experiments, which were designed to pin down the alleged role of demand characteristics in Kosslyn, Ball and Reiser's (1978) experiments, were not themselves free from such demand effects (cf. Kosslyn, Pinker, Smith and Shwartz, 1979).

ally, images resemble objects of perception, as well as the assumption that imagery processes resemble perceptual processes (to cite Shepard and Podgorny's (1978) expression), are both far from being admitted generally. On the basis of these considerations, it seems likely that most subjects do *not* conceive of images as entities actually possessing spatial properties, or genuinely reflecting the spatial properties of objects. They do not appear inclined to treat images like physical stimuli, or to project onto images their knowledge of physical stimuli. This makes the claim unlikely that, basically, subjects involved in mental rotation or mental scanning experiments map their knowledge of relationships which hold among speed, time, and physical distance, onto their imaginal representations of objects. If it were the case that they actually performed such mapping, subjects would also certainly be likely to do so when solicited for reasoning on images and imagery processes.[4]

However, this interpretation may be confronted with the following potential argument: the tacit knowledge that is assumed to govern behavior in mental rotation or image scanning experiments can only be accessed when subjects are engaged in performing such tasks. Thus, a questionnaire would not tap the said knowledge. However, while we are aware that this view deserves attention, in its present form it is close to being undisprovable. In the absence of experimental data likely to substantiate such a line of reasoning, our results may be considered as putting a strain on a large class of more straightforward tacit knowledge theories. Furthermore, it should be noted that a growing body of experimental evidence makes it clear that images do reflect perceptual phenomena that people are completely unaware of, as, for example, orientation-contingent color aftereffects (cf. Finke, 1980), the 'oblique effect' (cf. Kosslyn, 1981), and so on. Such results lend support to the idea that tacit knowledge theories cannot account for a number of imagery phenomena. Our results also contribute to question tacit knowledge accounts, since even for imagery phenomena which mimic perceptual phenomena that are very well known, people's intuitions are obviously deficient.

In addition, it is legitimate to inquire why our subjects, when questioned about mental rotation and mental scanning, apparently did not use introspectively available information on the time it takes to perform actual manipulative rotations or perceptual scanning. It cannot be excluded that, despite presumably possessing such kinds of information, subjects were reluctant to

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[4]All the lines of argument developed here, as by other authors, take it for granted that people's knowledge is *exact* as concerns the relationships holding among distance, time, and speed of processing for real objects. This assumption, however, might itself be open to question ever since the demonstration by McCloskey, Caramazza and Green (1980) that a majority of adult subjects evidence striking misconceptions about the (physical) motion of objects (see also Caramazza, McCloskey and Green, 1981).

reduce hypotheses about mental life to quantitative predictions on functional relationships among physically measurable variables. It should be noted here that, although slightly more than half of our sample agreed with the statement that images are amenable to a scientific approach, a strong overall tendency persisted for either dubitative or clearly negative attitudes on this point (question 1). However, discrepancies between people's declared representations of their own cognitive processes and objective regularities displayed in their actual cognitive functioning are unlikely to be entirely accounted for by hypothetical response biases of the kind mentioned above. In this respect, it is worth pointing out that children, who presumably do not relate mental processes to operationalized chronometric measurements, nonetheless show rotation effects (cf. Marmor, 1975).

Finally, it should be noted that, despite the overall inability of people outside the domain of imagery research to predict phenomena such as mental rotation or mental scanning, a small number of them apparently know, or at least possess some form of knowledge that allows them to correctly predict the outcomes of classical experiments on image processing. It seems reasonable to inquire whether these people, when involved as subjects in Shepard- or Kosslyn-type paradigms, will exhibit behavioral regularities similar to those of completely 'naive' subjects, who constitute the majority of current experimental populations. An appropriate methodological recommendation would consist here in checking the state of knowledge of subjects participating in such experiments (by using post-experimental questionnaires) in order to see whether their individual performances are influenced by such knowledge. Recent research has usefully pointed to possible effects of experimenter's knowledge and expectations in image experiments (cf. Intons-Peterson, 1983). Similar attention directed towards the subjects should provide fruitful extensions of imagery research in the future.

References

Caramazza, A., McCloskey, M. and Green, B. (1981) Naive beliefs in "sophisticated" subjects: Misconceptions about trajectories of objects. *Cog.*, *9*, 117–123.

Cooper, L.A. and Shepard, R.N. (1973) Chronometric studies of the rotation of mental images. In W.G. Chase (ed.), *Visual Information Processing*. New York, Academic Press.

Denis, M. (1975) *Représentation imagée et activité de mémorisation*. Paris, Editions du C.N.R.S.

Denis, M. (1979) *Les images mentales*. Paris, Presses Universitaires de France.

Di Vesta, F.J. and Ross, S.M. (1971) Imagery ability, abstractness, and word order as variables in recall of adjectives and nouns. *J. verb. Learn. verb. Behav.*, *10*, 686–693.

Ernest, C.H. and Paivio, A. (1969) Imagery ability in paired-associate and incidental learning. *Psychon. Sci.*, *15*, 181–182.

Finke, R.A. (1980) Levels of equivalence in imagery and perception. *Psychol. Rev.*, *87*, 113–132.

Finke, R.A. and Pinker, S. (1982) Spontaneous imagery scanning in mental extrapolation. *J. exp. Psychol.: Learn. Mem. Cog.*, *8*, 142–147.

Frandsen, A.N. and Holder, J.R. (1969) Spatial visualization in solving complex verbal problems. *J. Psychol.*, *73*, 229–233.

Intons-Peterson, M.J. (1983) Imagery paradigms: How vulnerable are they to experimenters' expectations? *J. exp. Psychol.: Hum. Percep. Perf.*, *9*, 394–412.

Kosslyn, S.M. (1975) Information representation in visual images. *Cog. Psychol.*, *7*, 341–370.

Kosslyn, S.M. (1980) *Image and Mind.* Cambridge, MA, Harvard University Press.

Kosslyn, S.M. (1981) The medium and the message in mental imagery: A theory. *Psychol. Rev.*, *88*, 46–66.

Kosslyn, S.M., Ball, T.M. and Reiser, B.J. (1978) Visual images preserve metric spatial information: Evidence from studies of image scanning. *J. exp. Psychol.: Hum. Percep. Perf.*, *4*, 47–60.

Kosslyn, S.M., Pinker, S., Smith, G.E. and Shwartz, S.P. (1979) On the demystification of mental imagery. *Behav. Br. Sci.*, *2*, 535–581.

Le Ny, J.-F. and Denhière, G. (1982) Profile of CINNA: Construction of individualized texts. *Text*, *2*, 193–210.

Marmor, G.S. (1975) Development of kinetic images: When does the child first represent movement in mental images. *Cog. Psychol.*, *7*, 548–559.

McCloskey, M., Caramazza, A. and Green, B. (1980) Curvilinear motion in the absence of external forces: Naive beliefs about the motion of objects. *Science*, *210*, 1139–1141.

Mendoza, D. and Wichman, H. (1978) "Inner" darts: Effects of mental practice on performance of dart throwing. *Percep. Mot. Skills*, *47*, 1195–1199.

Paivio, A. (1971) *Imagery and Verbal Processes.* New York, Holt, Rinehart, & Winston.

Paivio, A., Rogers, T.B. and Smythe, P.C. (1968) Why are pictures easier to recall than words? *Psychon. Sci.*, *11*, 137–138.

Paivio, A. and Yuille, J.C. (1967) Mediation instructions and word attributes in paired-associate learning. *Psychon. Sci.*, *8*, 65–66.

Pylyshyn, Z.W. (1979) The rate of "mental rotation" of images: A test of a holistic analogue hypothesis. *Mem. Cog.*, *7*, 19–28.

Pylyshyn, Z.W. (1981) The imagery debate: Analogue media versus tacit knowledge. *Psychol. Rev.*, *88*, 16–45.

Richman, C.L., Mitchell, D.B. and Reznick, J.S. (1979) Mental travel: Some reservations. *J. exp. Psychol.: Hum. Percep. Perf.*, *5*, 13–18.

Ryan, E.D. and Simons, J. (1982) Efficacy of mental imagery in enhancing mental rehearsal of motor skills. *J. Sport Psychol.*, *4*, 41–51.

Shaver, P., Pierson, L. and Lang, S. (1974–75) Converging evidence for the functional significance of imagery in problem solving. *Cog.*, *3*, 359–375.

Shepard, R.N. and Cooper, L.A. (1982) *Mental Images and Their Transformations.* Cambridge, MA, MIT Press.

Shepard, R.N. and Podgorny, P. (1978) Cognitive processes that resemble perceptual processes. In W.K. Estes (ed.), *Handbook of Learning and Cognitive Processes.* Hillsdale, NJ, Erlbaum.

Reference note

1. Kosslyn, S.M. and Folk, M.D. (1982) Imagery theory vs. tacit knowledge explanations: Testing contrasting predictions. Unpublished manuscript, Brandeis University.

Résumé

Des sujets adultes ont reçu un questionnaire contenant de brèves descriptions d'expériences sur l'imagerie et ont dû prédire quels étaient les résultats classiques de ces expériences. La majorité des sujets prédisent

correctement les effets positifs de l'imagerie sur l'apprentissage verbal, le raisonnement spatial et le raisonnement déductif. Une minorité de sujets, en revanche, prédisent les effets de la répétition mentale sur l'acquisition d'habilités motrices. Par ailleurs, un très petit nombre de sujets prédisent les résultats classiques des expériences sur la rotation mentale (la durée requise pour accomplir une rotation mentale est d'autant plus longue que l'angle à parcourir est plus grand), des expériences sur l'exploration d'images mentales (la durée d'exploration est d'autant plus longue que la distance à parcourir est plus grande) et des expériences montrant que la vérification de propriétés d'objets imaginés est d'autant plus longue que ces objets sont imaginés à de petites tailles. La très faible capacité, pour les sujets, de prédire de tels résultats est difficilement explicable par les hypothèses invoquant le rôle de "savoirs tacites": si l'on postule que la connaissance de l'équation reliant vitesse, durée et distance physique est de nature à "pénétrer" le traitement de l'image, il devrait s'ensuivre que ce savoir est utilisable par les sujets pour prédire correctement les résultats de telles expériences.