

Words and Pictures in Reports of fMRI Research

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I want to briefly note three worries by philosophers about how results of fMRI research have sometimes been presented.

1. Mole and Klein (this volume) argue that some of these reports commit serious fallacies, for example, confusing (a) the data's being *consistent* with a hypothesis with (b) the data's *confirming* the hypothesis.

This is indeed a fallacy, if the relevant sort of consistency is *logical* consistency. However, the expression "is consistent with" is often used by scientists to mean something much stronger, something like *confirms* or even *strongly confirms*.

Compare Mole and Klein's worry with the following passage from Johnson-Laird (2001, p. 85):

... intelligent individuals make mistakes in reasoning in everyday life. A lawyer in a civil action, for example, got an opposing expert witness to admit the following two facts concerning a toxic substance, trichloroethylene (TCE):

If TCE came down the river (from other factories), then TCE would be in the river bed.

TCE was not in the river bed.

At this point, the lawyer asked the witness:

The pattern is consistent with the fact that no TCE came from the river, isn't it?

What he should have pointed out is that this conclusion follows necessarily from the premises. Neither the lawyer nor the author of the book from which this report comes appears to have noticed the mistake (see Harr 1995, pp. 361-362).

Johson-Laird, like Mole and Klein, apparently supposes that “consistent” in this sort of context must mean “logically consistent”. One might instead conclude from the transcript that “consistent” in such a context means something much stronger. Indeed, a web search for documents containing the phrase “is consistent with” appears to show that a stronger meaning is often intended in scientific contexts, something like “implies or confirms,” as in “Evidence from Amazonian forests is consistent with isohydric control of leaf water potential,” the title of Fisher et al. (2006), to take a random chosen example.

It is true that this use of “consistent” may confuse logicians, philosophers, and psychologists, perhaps even judges and members of juries. That may be something to worry about.

2. Mole et al. (2007), relying on Haxby et al. (2001) and Hanson, Matsukkaa, & Haxby (2004), argue that Kanwisher (e.g. Kanwisher & Yovel, 2006) overstates the implications of fMRI research for whether “the fusiform face area ... is the site of cognitive resources that are specialized for and dedicated to the processing of faces” (Mole et al., 199). One problem is that activity elsewhere in the brain can *carry information about* perceived faces and activity in the “fusiform face area” can *carry information about* other things perceived. Furthermore, “the locus of maximum activation need not be the place where the processing is done. It might simply be an indication of the place at which the load is greatest. ... The fact that some manual tasks, such as hammering, lead to blisters on the palm of the hand does not show that it is the palm that performs the task of hammering. ...”

On the other hand, Mole et al. reject Haxby's conclusion that faces must receive some sort of “distributed representation” in a relevant sense. They argue that it has not been shown that the relevant activity represents anything except in the sense of “carrying information” in a statistical

sense. This does not imply that the relevant activity *determines the content* of associated mental states.

3. I noted above that a scientific use of “consistent” might confuse certain readers for whom that use is relatively unfamiliar. Roskies (this volume) argues that presenting the results of fMRI research in the form of what look like photographs can be very misleading in a somewhat different way, because of great differences in the way in which photographs represent what they are photographs of and the way in which fMRI pictures represent what they represent. To the reader, it may appear that one can see the result of the fMRI experiments just by looking at the picture, much as one can see what the camera was pointed by looking at a photograph. This is a complete illusion, because of the large amount of more or less controversial interpretation used to come up with the fMRI picture. As Roskies puts it, the “inferential distance” between a photo and what it depicts is normally quite small as compared with the inferential distance between an fMRI picture and what it depicts.

In summary, readers of research reports may be subject to various *cognitive illusions* that go beyond those discussed by psychologists like Kahneman and Tversky. Readers may misunderstand the ways certain words are being used, words like “consistent” for example, a misunderstanding that may negatively affect their appreciation of the research reported. They may fail to distinguish different ways in which activity might or might not represent something. And they may fail to appreciate the “inferential distance” between a picture and what it depicts, a misunderstanding that may lead them to read more into the results than they should.

References

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