

(Dis)confirmations of expectancies: two parts of the whole.

We agree with Van Laarhoven and Evers [1] on several issues: No doubt that placebo and nocebo are genuine phenomena. We also agree that the placebo effects may vary as a function of the strength of expectation, and that there are various explanatory mechanisms for placebo and nocebo. However, we disagree with some issues, and would like to repeat our call to search for the boundaries of the placebo and nocebo phenomenon.

Some authors [1] seem to believe that placebo and nocebo effects by verbal instruction are fundamentally different from those by direct experience (conditioning). Conditioning is often related to unconscious and automatic learning, whereas learning by verbal instruction is assumed to be conscious. This view is overly dualistic and simplistic. There may well be three procedures to install expectancies: direct learning (conditioning), vicarious learning and learning by verbal instruction; but without additional rigorous experimentation one may not declare the effects of a particular procedure more automatic than those of another procedure. Within the placebo literature Stewart-Williams and Podd [2] elaborated this controversy, and argued that all procedures have much in common. It is worth noting that in humans conscious expectations have been found to play an important role in direct learning [3], and that verbal instructions can also have automatic effects [4].

In our editorial [5] we posit that two opposing mechanisms seem to be at stake. In some situations expectancies guide our experiences, and act as self-fulfilling prophecies: we feel what we expect. In other situations we are well aware that our expectancies do not match reality. As a consequence, expectancies are readily adjusted to reflect our experience. We agree with the authors that the latter process can be more complex and can include scenarios in which expectations remain unaltered despite disconfirming evidence. In fact, the exploration of these evidence-resistant beliefs and their consequences for perception and cognition are an emerging topic [6]. However, the purpose of our editorial was to point out that expectations are not

omnipotent but can be discarded or revised – an aspect that has received only little attention amidst the enthusiasm about the power of placebos. Generally, we strive for coherent representations that are in accordance with what we experience as only these representations allow for optimal prediction and efficient control of future events. Any deviation from this representation, as it is the case for evidence-resistant beliefs, comes with costs (e.g. additional processing load) that commonly initiate updating of expectations. We have to understand the limitations of expectations as well as the interplay between both processes to be able to exploit placebo mechanisms in a more systematic manner. Our call to search for the boundaries of placebo and nocebo is therefore not to be understood as a competition between rival theories. Both mechanisms are complementary, and are playing a fundamental role in daily life. They are both parts of the whole. Moreover, both mechanisms are not unique to pain, but are equally relevant for other somatic experiences, and probably for all perceptual experiences [7]. Of importance is to discover the exact conditions when one mechanism prevails over the other one. In our editorial we proposed some guiding principles. We repeat here some of these principles, and relate them to the points raised by Van Laarhoven and Evers [1]. (1) Expectations about ambiguous experiences are more malleable to expectations than expectations with clear perceptual characteristics. This proposition is similar to one in the domain of visual perception. What you visually perceive in the well-known ambiguous figures (e.g. mother in law) depends upon your expectation. An ambiguous stimulus in the area of pain could well be the thermal grill illusion [8]. This proposition still awaits empirical scrutiny. (2) Expectations about experiences that remain within a certain margin of the actual experience will be more susceptible to placebo and nocebo effects. Expectations outside this margin are more likely to lead to disconfirmations of expectancies. This proposition is similar to the one explicated in the adaptation level theory [7]. To our knowledge, there is no direct test of this idea in pain. As outlined above, we agree with the authors that expectations may be maintained even in the face of disconfirming evidence. However, van Laarhoven and Evers [1] argue

against this proposition by citing the work of Arntz and colleagues [9], who reported that underpredicted pain led to lower pain experiences than correctly predicted pain. In that particular study other explanations could not be ruled out. The effect was only found in self-reports leaving open the question whether the effect is a demand effect or response bias. In fact, in that study underpredicted pain was more disruptive than correctly predicted pain. (3) The effects of expectancies may vary as a function of repeated experiences. Placebo and nocebo effects may initially prevail, but with repeated experience these effects may extinguish. Most related work on this proposition has been informed by the exposure literature [10] and by the match/mismatch model by Arntz and colleagues [11]

In conclusion, we call for creative experiments that allow to further the field of placebo and nocebo. We believe that this will be the case when the working of an opposing, complementary mechanism is also taken into consideration. This discussion shows that we have departed from the dispute about the existence of placebo and nocebo effects and the initial awe regarding their potential but have entered the next phase of thorough investigation in order to understand both phenomena at a deeper level.

Conflict of interest statement

The authors have no conflict of interest in relation to this commentary.

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