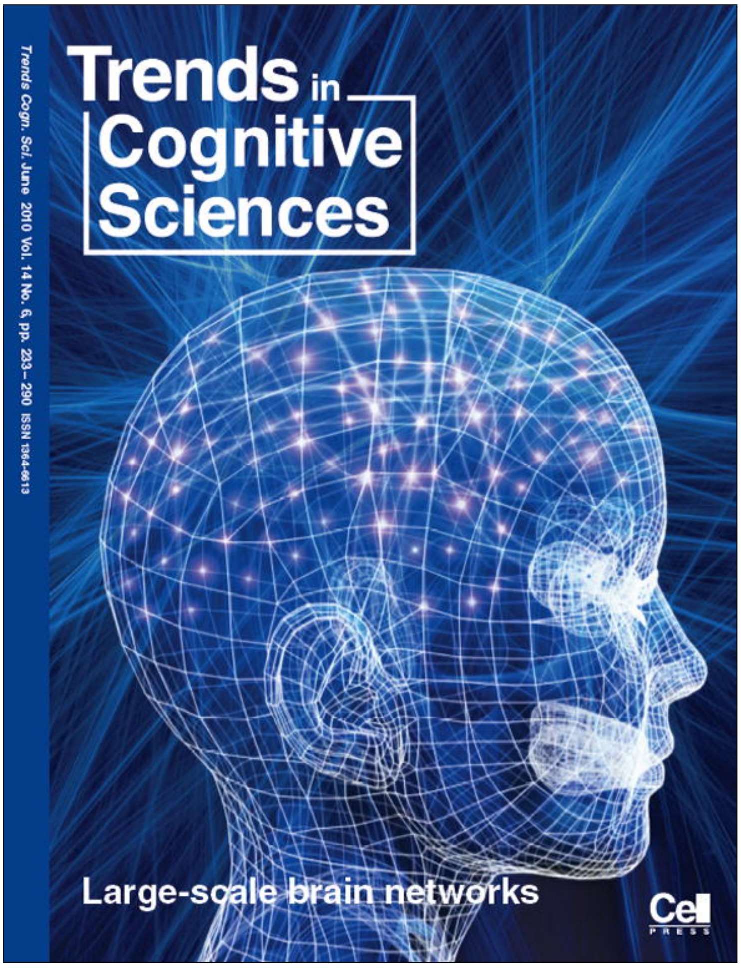
Trends Cogn. Sci. June 2010 Vol. 14 No. 6, pp. 233–290 ISSN 1364-6613
Trends in Cognitive Sciences
Large-scale brain networks
Cell PRESS

them. Experiments can refine our understanding of such phenomena but it takes demonstrations to inspire us to design the experiments. Similarly, grammaticality judgments are the raw material for hypotheses about the structure of the language faculty. Without such judgments, the experimental enterprise cannot get off the ground.

Nor are experiments necessarily better than subjective judgments at distinguishing the factors affecting grammaticality. For example, if judgments reflect both grammatical structure and lexical class, failing to control for either will produce misleading results, regardless of how the judgments are arrived at [6]. Moreover, the question being asked can produce an uninformative answer, for example when [7] found that ranking produces gradient results for categorical concepts.

Corpora too can be useful, but it is not always clear what they tell us. Very frequent constructs in corpora are usually judged unproblematic by native speakers. Rare or variable constructs are the ones on which native speakers differ and theoretical issues often turn. Moreover, corpora can be contaminated by material from nonnative speakers. Finally, as [8] points out, the absence of a construct in a corpus can reflect many factors, including grammatical impossibility, inappropriateness of style, and processing complexity (think of multiple center-embedding). Again, it requires imagination to incorporate suitable controls.

We conclude that, as in all scientific inquiry, grammaticality judgments should be used as carefully as possible, controlling for all possible relevant factors (including confirmation bias), and that they should not be considered privileged over other sorts of data except by virtue of their convenience.

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Letters

Manipulating visual experience: Comment on Op de Beeck and Baker

Isabel Gauthier[1], Alan C-N. Wong[2] and Thomas J. Palmeri[1]

[1] Department of Psychology, Vanderbilt University, Wilson Hall, 111 21st ave South, Nashville, TN 37240, USA
[2] Department of Psychology, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong

In their recent *TiCS* contribution, Op de Beeck and Baker [1] (hereafter OB) suggest we abandon the idea that fairly local changes, limited to a single visual area, support visual learning. Instead, they propose that visual experience causes moderate and distributed changes that modulate pre-existing representations. We argue that their review overlooked something crucial: The *kind* of experience matters to how we learn visually. Unlike OB, we believe that *both* local and distributed changes can accompany visual object learning, depending on the task demands during learning.

OB review studies that use a wide variety of training tasks. For instance, participants (humans or monkeys) learn to categorize objects in one particular way [2], learn to discriminate visually similar objects [3] or learn to individuate objects by associating them with individual labels [4]. By focusing on the common aspects of visual learning, OB fail to note the potential importance of these training differences. This oversight is hard to avoid given current evidence. Indeed, many studies contrast categories that differ in shape, so we know that shape matters to the visual system [5]. Many studies hold shape constant but vary what participants are asked to attend to, so we know that attention can modulate visual responses [6]. And many studies, reviewed by OB, show that experience of some sort can change visual representations [2–4,7,8]. But because almost none of these studies *manipulate experience*, we have failed to learn much about whether the kind of experience with objects matters or not. As acknowledged by OB, most studies cannot even conclude if the learning effects obtained were a result of the complex training tasks or mere exposure to objects.

Recent work of ours manipulated experience by training different groups of participants with the same objects called 'Ziggerins' (Figure 1) for the same amount of time, but in very different ways [9,10]. One group learned to individuate Ziggerins by associating them

Corresponding author: Gauthier, I. (isabel.gauthier@vanderbilt.edu).

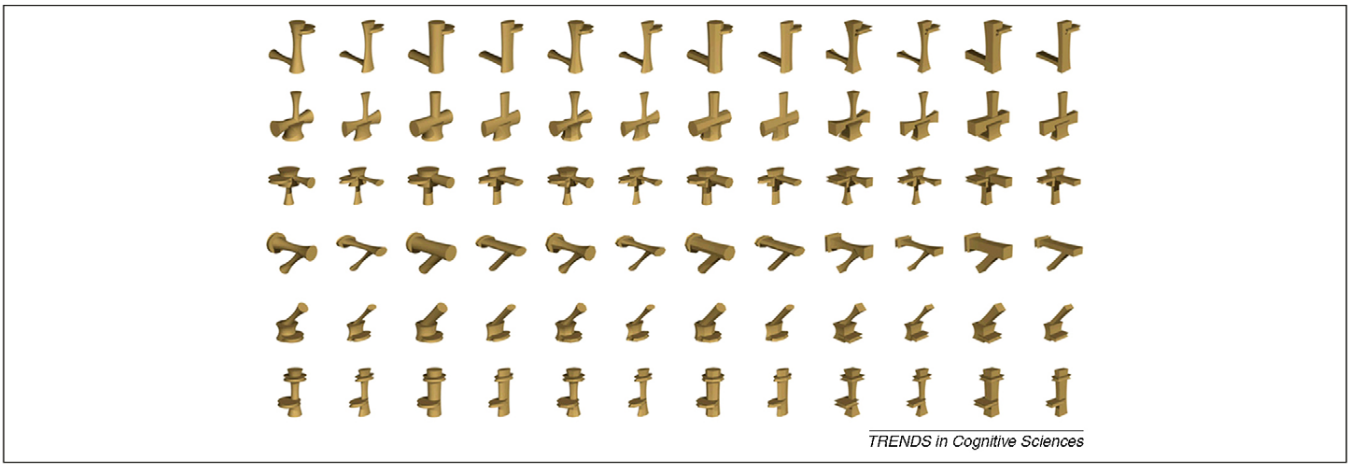

Figure 1. The Ziggerins, objects used in a comparison of training paradigms [9,10]. Each row shows 12 different individuals within the same category.

with individual names, as in prior Greeble training studies. Another group learned to categorize objects according to common configuration of parts and practiced the rapid scanning of arrays of many Ziggerins. Behaviorally, although both groups learned to process the objects faster, only the first group learned to perceive Ziggerins holistically [9]. In the visual system, learning to individuate led to local changes in the right fusiform gyrus, correlated with changes in holistic processing [10]. By contrast, learning to categorize and scan led to bilateral and distributed changes all along the occipito-temporal pathway.

In sum, the neural basis of visual learning depends on the kind of experience we have learning about objects. Until more studies systematically manipulate experience, it might not be warranted to suggest that all visual object learning relies on the same mechanisms.

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1364-6613/$ – see front matter
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Letters Response

Informativeness and learning: Response to Gauthier and colleagues

Hans P. Op de Beeck[1] and Chris I. Baker[2]

[1] Laboratory of Biological Psychology, University of Leuven (K. U. Leuven), Tiensestraat 102, 3000 Leuven, Belgium
[2] Laboratory of Brain and Cognition, National Institute of Mental Health, National Institutes of Health, 10 Center Drive, Building 10, 3N228, Bethesda, MD 20892, USA

Gauthier and colleagues (henceforth GWP) raise the importance of the type of visual experience in determining learning-related neural changes and propose that local changes can occur given particular forms of experience [1]. We completely agree that the kind of experience matters. These effects are predicted by the informativeness hypothesis we concluded our review with [2]. However, we question whether the work discussed in [1] actually demonstrates local neuronal changes.

First, we clarify the terms 'distributed' and 'local'. Fully distributed implies that all neurons within a larger region

Corresponding author: Op de Beeck, H.P. (hans.opdebeeck@psy.kuleuven.be); Baker, C.I. (bakerchris@mail.nih.gov).