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Beyond belief: Structured techniques prove more effective than a placebo intervention in a problem construction task

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ABSTRACT

Problem construction is one of the first steps in creative problem solving and research has shown clear links between problem construction ability and creative output. Here, we compared two active techniques with that of a placebo intervention and show a benefit in problem construction performance for the active techniques. The active techniques required participants to either utilise six questions (*six men*), or adopt six perspectives, incorporating a range of specific questions (*six hats*). The placebo intervention (*brain-breathing*) was specifically constructed to seem both plausible and effective. We had 118 participants randomly allocated to one of the three groups (*six men*, *six hats* and *brain-breathing*) and, after reading a brief synopsis of their allocated tool, they then attempted to restate a given problem in as many different ways as they could within an allotted time. Performance was measured in terms of the *fluency*, *quality*, *flexibility* and *originality* of responses. Results showed that using the six men tool produced greater fluency, flexibility and originality relative to brain-breathing and the six hats. Use of the six hats tool also led to the production of more original responses relative to the brain-breathing control group. Importantly, there was no difference in reported motivation between the groups, but those using the six men and the brain-breathing tools found these easier to use compared to the six hats. Furthermore, those using the six men tool found this to be more useful and indicated that they were more likely to use this again in the future. Hence, both six men and six hats tools benefited performance, though in distinct ways. These results support the notion that explicitly scaffolding thinking can benefit creative problem solving.

1. Introduction

Creative problem solving (CPS) refers to a framework or approach used when attempting to solve a problem and produce both useful *and* original solutions. It is largely based on the early work of Osborn (1953), which stemmed from the desire to explicitly define the creative process and provide a structured approach to enhancing creative problem solving ability. Since then, whilst others have worked to develop and refine the framework (see e.g., Buijs, Smulders, & van der Meer, 2009; Isaksen & Treffinger, 2004; Puccio, Murdock, & Mance, 2005) there has been some general agreement that the process often begins with problem construction (see e.g., Basadur, Graen, & Graen, 1982; Reiter-Palmon & Robinson, 2009). Problem construction includes the anticipation of problems, identifying problems when none are evident, and structuring an ill-defined problem so problem solving efforts can proceed (Mumford, Reiter-Palmon, & Redmond, 1994; Runco & Nemiro, 1994). Research has

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shown that problem construction is an essential skill in creative problem solving and that problem construction ability is clearly related to creative output (see e.g., Mumford, Baughman, Threlfall, Supinski, & Costanza, 1996; Reiter-Palmon, Mumford, & Threlfall, 1998). Hence, attempts to train and/or improve problem construction ability would be expected to have beneficial effects on creative problem solving performance.

There is consensus in the literature that training in creative problem solving can be effective (see, DeHaan, 2009; Ma, 2006; McIntyre, Hite, & Rickard, 2003; Scott, Leritz, & Mumford, 2004b; Wang & Horng, 2002) and both business and education view such improvements as essential for future economic growth and educational development (see, Fontenot, 1993; Pithers & Soden, 2000). However, while there is much evidence that training programmes themselves can lead to improvements in problem finding, evidence for specific tools is patchy. Within the problem finding literature, we find evidence for brainstorming (e.g., Kurtzberg & Reale, 1999) and problem restatements (e.g., Mumford et al., 1994), as well as our own work on structured thinking techniques (Vernon & Hocking, 2014), but little else. This is surprising given the volume of tools that are out there, and the lack of a clear empirical foundation for such tools has recently led to calls for researchers to focus on this issue in an attempt to identify which tools work (see, Ma, 2006; Vernon, Hocking, & Tyler, under review).

This led us to examine whether training participants to use a specific tool would enhance their problem construction ability. The tools we focused on were, The Six Good Men referred to by Rudyard Kipling (Kipling, 1902) and the Six Thinking Hats, put forward by de Bono (2009). The *six men* simply refer to the six questions: who, how, what, why, where and when. The rationale for this tool is that such questions provide an explicit structure to the individual in order to help them explore the issue using the questions as cues which in turn may encourage diverse responses and facilitate understanding (see e.g., Annesley, 2010; Paterson, 2006). The *six hats* tool is similar in that it refers to six distinctly coloured hats that emphasise a particular style or approach to thinking. For instance the yellow hat encourages the individual to focus on the positive issues whilst the black hat forces the individual to think about the negative consequences or risks (see, de Bono, 2009). The underlying rationale for this tool is that it provides an explicit framework to scaffold or facilitate creative thinking (see, Rizvi, Bilal, Ghaffar, & Asdaque, 2011).

It should be emphasised that there is nothing particularly special about these tools and the role they play in problem construction performance. They were selected for a number of reasons. First, is the simple pragmatic stance of having to begin the assessment of such tools somewhere and that the Six Thinking Hats is a well-known and popular tool that has been in circulation for some time (see, de Bono 2009). Given the six elements of this tool the Six Good Men, which also contains six elements, provides a good control/alternative. Nevertheless, it should be made clear that whilst we are focusing here on the Six Good Men and the Six Thinking Hats this does not preclude many of the other tools from potentially showing beneficial effects on problem construction performance (see e.g., Kurtzberg & Reale, 1999). Furthermore, and potentially more importantly, we wanted to know whether the problem construction benefit previously shown for these tools was simply the result of a placebo effect. For instance, we found that when used on a problem construction task, both tools proved to be more effective compared to a no-intervention control group (Vernon & Hocking, 2014). However, whilst suggestive differences were evident in effect sizes between the two interventions there were no clear differences between them. Given the fact that the control group were not given a tool to use it could be that use of a tool benefits a user through repetition, because the tool encourages six iterations, or placebo, because the tool promotes improvement through the strength of belief. The idea of a placebo influencing behaviour is widely documented in the scientific literature and a variety of evidence is available showing that an individual's expectation can have a dramatic effect on behaviour (see e.g., Moseley et al., 2002). Hence, it may be that when given a tool to use on a problem construction task participants naturally expect their performance to improve. Furthermore, participants' level of motivation was not measured and those given a tool to use may have, as a consequence of using the tool, become more motivated to complete the task, which could also account for the benefit shown by those using a tool as motivation has been shown to be a key factor in creative performance (Amabile, 1983, 1996; null; Fasko, 2001; Sternberg & Lubart, 1999). Hence, to ascertain more precisely whether these two tools are capable of eliciting a beneficial effect on problem construction performance we compared performance on the two experimental interventions (i.e., *six men*, *six hats*) to a placebo intervention whilst simultaneously measuring participant motivation. Additionally, this placebo tool comprised of six elements to control for any potential iteration bias.

The placebo intervention developed for this study was called *brain breathing* and is based on the plausible links established between breathing influencing brain activity (e.g., Takahashi et al., 2005), in particular the alpha electroencephalographic frequency range which has been shown to be associated with creativity (see, Fink & Neubauer, 2006). The brain breathing technique simply requires participants to close their eyes, take three in-breaths and three out-breaths, and then open their eyes and note down any ideas that have occurred to them. Having a placebo tool that is comprised of six elements (i.e., 3 in-breaths and 3 out-breaths) helps to control for any potential iteration bias. In addition, it was thought that reference to a technique that directly involved the 'brain' would tap into the seductive allure of brain based explanations (see, Weisberg, Keil, Goodstein, Rawwon, & Gray, 2008).

Thus, the aim of this study was to compare the effectiveness of each experimental tool to that of a placebo-intervention on the same problem construction task. On the basis of evidence showing the facilitative effect of effortful, structured thinking (e.g., Reiter-Palmon & Robinson, 2009), and our previous research suggesting that the *six men* and the *six hats* are useful we predict that participants using either experimental technique would exhibit improved problem construction ability compared to the placebo-intervention control group. However, it is not clear at this stage whether any differences in problem construction ability would emerge between the two experimental techniques.