BVS

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Buffy Vampire Slayer Relationships
Creativity as Blind Variation and Selective Retention:

Philosophy, Psychology, or Both?
Introduction

- Donald T. Campbell’s (1960) “Blind variation and selective retention in creative thought as in other knowledge processes”
  - Stimulated controversy for the next half century
  - Furthermore, this controversy engaged both philosophers and psychologists
  - Moreover, proponents and opponents represent both disciplines:
  - The debate cuts across disciplinary lines
Introduction

- Hence, here I will examine BVSR as
  - a philosophical proposition, and
  - a psychological hypothesis
- arguing that the two are mutually reinforcing
BVSR as philosophical proposition

- Though published in *Psychological Review*, the philosophical nature of BVSR was clear
  - First, Campbell quoted at great length Alexander Bain (1855), Paul Souriau (1881), Ernst Mach (1896), and Poincaré (1921)
  - Second, as implied by the title, Campbell was clearly concerned with epistemology – the “knowledge processes”
- Indeed, according to the current editor, this paper could not be published in *PR* today!
BVSR as philosophical proposition

- In addition, rather than develop BVSR’s psychological side, Campbell (1974) chose to elaborate the philosophical aspect into his well-known *evolutionary epistemology*

- An elaboration that had explicit connections with the ideas of “conjectures and refutations” in Karl Popper’s (1963) philosophy of science developed at almost the same time

- To wit, “bind variation” ≈ “bold conjecture”
BVSR as philosophical proposition

- It was this later version of Campbell’s theory that had such a big impact on philosophical thinking both
  - *Pro* (Bradie, 1995; Briskman, 1980/2009; Heyes & Hull, 2001; Kantorovich, 1993; Nickles, 2003; Stein & Lipton, 1989; Wuketits, 2001), and
  - *Con* (Kronfeldner, 2010; Thagard, 1988)
That said, Campbell’s (1960, 1974) theory was never really logically adequate because:

- One, he never defined creativity!
- Two, his definition of variational “blindness” was “connotative” rather than “denotative”

Later, he tried to remedy the latter by introducing alternative terms, such as “unjustified,” but without appeasing his critics.

Campbell, in fact, missed a golden opportunity, for if he had provided precise formal definitions, the relation between BVSR and creativity would be shown to be essential rather than hypothetical.
Given the set $X$ of ideas (or responses):

- $x_i$, where $i = 1, 2, 3, \ldots k$ and $k \geq 1$

Each idea has three \textit{subjective} parameters

- \textit{initial} generation probability: $p_i$
  - where $0 \leq p_i \leq 1$, $\Sigma p_i \leq 1$

- \textit{final} utility: $u_i$, where $0 \leq u_i \leq 1$:
  - viz. probability of selection and retention

- \textit{prior} knowledge of $u_i$: $v_i$
  - where $0 \leq v_i \leq 1$ (e.g., ignorance to expertise)
BVSR as philosophical proposition

- Now, on the one hand, the creativity of idea $x_i$ is given by the multiplicative function:
  - $c_i = (1 - p_i)u_i(1 - v_i)$, where $0 \leq c_i \leq 1$
  - where
    - $(1 - p_i) = \text{the idea's originality, and}$
    - $(1 - v_i) = \text{the idea's surprisingness}$
  - i.e., to be creative is to be original, useful, and surprising, where the multiplicative function ensures that unoriginal, useless, and/or obvious ideas cannot be deemed creative
BVSR as philosophical proposition

- On the other hand, the sightedness $s_i$ of idea $x_i$ is given by:
  - $s_i = p_i u_i v_i$,
  - where $0 \leq s_i \leq 1$ and $s_i = 1$ when $p_i = u_i = v_i = 1$
  - Thus, an idea’s blindness is defined by $b_i = 1 - s_i$

- Moreover, the sightedness $S$ of the entire set $X$ is given by the average of the $k s_i$’s, namely:
  - $S = 1/k \sum p_i u_i v_i$, where $0 \leq S \leq 1$

- Ergo, the set’s blindness is defined by $B = 1 - S$

- It then follows logically that …
BVSR as philosophical proposition

- **Part I**: $c_i$ and $s_i$
  - *First*, highly sighted ideas cannot be highly creative
  - *Second*, highly unsighted ideas can vary from the highly creative to the highly uncreative

- **Part II**: $c_i$ and $S$
  - *First*, highly sighted sets cannot contain highly creative ideas
  - *Second*, highly unsighted sets contain ideas that vary from the highly creative to the highly uncreative
BVSR as philosophical proposition
BVSR as philosophical proposition

- Consequently, BVSR has an essential relation with creativity
  - In particular, it remains the only method available to distinguish between
    - \( p_i = 0, u_i = 1, \text{ and } v_i = 0, \)
      - the highly creative idea, versus
    - \( p_i = 0, u_i = 0, \text{ and } v_i = 0, \)
      - a useless but equally original idea
  - In a nutshell, BVSR is used to assess utilities when we do not already know them
  - We are “blind” to the actual and precise utility
BVSR as philosophical proposition

- Brief digression (cf. Nickles, 2003):
  - Plato’s *Meno* problem
  - The “No Free Lunch” Theorem
BVSR as philosophical proposition

- Brief digression (cf. Nickles, 2003):
  - Plato’s *Meno* problem
    - Q: How do we know that we know something without knowing it in advance?
    - A: We don’t – we can only engage in BVSR to test hypotheses or conjectures against a set criterion
    - Indeed, we may even have to use BVSR to identify the best criterion!
BVSR as philosophical proposition

Brief digression (cf. Nickles, 2003):

- The “No Free Lunch” Theorem
  - Q: How do we know that BVSR provides the optimal procedure for finding the best or only solution?
  - A: We know it doesn’t – BVSR provides the only procedure for identifying the most creative idea should any creative idea exist
  - BVSR can even be used to create an algorithm for solving future problems of a similar type
  - Yet when that happens, any solution generated by that algorithm will cease to be creative!
BVSR as psychological hypothesis

BVSR as psychological hypothesis

- However, if the previous philosophical analysis has any validity, then the BVSR-creativity connection may not be an entirely empirical question!
- Rather, the BVSR-creativity relation might be partly comparable to a statement like “all bachelors are unmarried” – albeit far more nuanced because blindness and creativity are not equivalent
BVSR as psychological hypothesis

- In particular, although “all bachelors are unmarried” is necessarily true (in the English language),
- and the statement “all highly creative ideas are highly blind” is also necessarily true (viz., whenever $u_i = 1$, $c_i \rightarrow 1$ as $b_i \rightarrow 1$)
- the statement “all highly blind solutions are highly creative” is necessarily false (e.g., if $u_i = 0$ and $v_i = 0$ but $p_i = 0$, then $c_i = 0$ though $b_i = 1$)
Indeed, the last statement can be better converted into an empirical question: “What proportion of highly blind ideas are highly creative?” And does that proportion vary across individuals and fields?
BVSR as psychological hypothesis

Nor is that the only empirical question elicited, for we also can ask:

- What cognitive processes and behavioral procedures generate sets that contain at least one idea where $p_i \to 0$, $u_i \to 1$, and $v_i \to 0$?
- What characteristics enable a person to engage in the foregoing cognitive processes and behavioral procedures?
- What environmental factors affect the person’s ability to engage in those processes or procedures?
BVSR as psychological hypothesis

- To illustrate, what is the function (+ or -) of
  - reduced latent inhibition?
  - remote association?
  - divergent thinking?
  - behavioral tinkering?
  - general intelligence?
  - introversion?
  - psychoticism or “positive” schizotypy?
  - domain-specific expertise?
  - multicultural experiences?

- These are all valid empirical questions!
BVSR as psychological hypothesis

- Furthermore, beyond the foregoing nomothetic analyses BVSR can be used as the basis for case studies of historic acts of creativity and discovery: e.g.
  - Picasso’s *Guernica* (Damian & Simonton, 2011; Simonton, 2007)
  - Galileo’s telescopic observations (Simonton, 2012)
Conclusion

- Hence, BVSR-creativity has both philosophical and psychological content
Postscript: A query

- William James (1880) early version of BVSR
- Then his 1884 two-stage theory of free will:
  - random generation of alternative possibilities
  - selection determined by personal attributes
- But why “random”? Why not just “blind”?
  - randomness implies blindness, but blindness does not necessitate randomness
- So can free will also be based on blind but nonrandom choices?
- If so, how do blind choice generators operate?