Creative Thoughts as Acts of Free Will:

A Two-Stage Formal Integration

Outline

- Integration
  - Two-Stage Creativity: Blind Variation Then Selective Retention
  - Two-Stage Free Will: Chance Then Choice
  - Two-Stage Creativity and Free Will
- Discussion

Two-Stage Creativity: Blind Variation Then Selective Retention

- Donald Campbell's (1960) blind-variation and selective-retention (BVSR) theory of creative thought and knowledge processes
- Recent reformulation in terms of three parameters that define
  - the "creativity" of any idea and
  - the "sightedness" of that idea on its initial generation

Two-Stage Creativity: Blind Variation Then Selective Retention

- Creativity
  - Although creativity can adopt many forms, for the moment the discussion will be restricted to problem solving
    - the quest for the most creative *solution* to a given problem
  - This restriction has the advantage that many acts of free will also involve everyday problem solving
    - finding the best *choice*

Two-Stage Creativity: Blind Variation Then Selective Retention

- Creative problem solving:
  - A given problem elicits *k potential* solutions,
  - namely, x_1, x_2, x_3 . . . x_i . . . x_k
  - and X = the entire set of solutions
  - e.g., for Maier's (1931, 1940) classic two-strings problem $k = 7$

Two-Stage Creativity: Blind Variation Then Selective Retention

- Each potential solution x_i has the following parameters:
  - p_i = *initial probability* that the individual will generate potential solution x_i
    - where $0 \leq p_i \leq 1$ and $\Sigma p_i \leq 1$
  - u_i = *final utility* of that potential solution
    - where $0 \leq u_i \leq 1$ and $0 \leq \Sigma u_i \leq k$
  - v_i = *prior knowledge* of the utility
    - where $0 \leq v_i \leq 1$ and $0 \leq \Sigma v_i \leq k$

Two-Stage Creativity: Blind Variation Then Selective Retention

- Then the "little-c" creativity of x_i is
  - $c_i = (1 - p_i)u_i(1 - v_i)$,
    - where $0 \leq c_i \leq 1$, and
    - $(1 - p_i)$ = solution *originality*
    - $(1 - v_i)$ = solution *surprisingness*
  - i.e., a quantitative and multiplicative representation other standard three-criteria definitions of creativity
  - N.B.: parameters are subjective rather than consensual (just as in free will)

Two-Stage Creativity: Blind Variation Then Selective Retention

- Sightedness:
  - For any given potential solution x_i
    - $s_i = p_i u_i v_i$, where $0 \leq s_i \leq 1$
    - N.B.: importance of v_i (cf. "lucky guesses")
  - For the entire set of solutions X
    - $S = 1/k\ \Sigma p_i u_i v_i$, where $0 \leq S \leq 1$
  - The inverse of sightedness is "blindness"
    - $b_i = 1 - s_i$ and $B = 1 - S$
    - Hence, a *bipolar continuum*:
      - From $b_i = 1$ to $s_i = 1$ or from $B = 1$ to $S = 1$

Two-Stage Creativity: Blind Variation Then Selective Retention

- Special note on "blindness"
  - Blindness *does not* require randomness
    - All randomness is blind but not all blindness is random
  - Systematic processes or procedures can yield potential solutions where $s_i << .5$
    - e.g., radar sweeps and search grids
    - e.g., BACON the discovery program
  - This has important repercussions for understanding free will

Two-Stage Free Will: Chance Then Choice

- Philosophers have identified many complexities associated with free will
  - e.g. determinism, indeterminism, liberatarianism, and compatibilism
- Psychologists have as well, such as
  - rational choice
  - self-regulation ("free won't")
- BVSR theory ≈ rational choice

Two-Stage Free Will: Chance Then Choice

- Two-stage theory (Doyle, 2010)
  - "first chance, then choice"
  - "two-stage model effectively separates chance (the indeterministic free element) from choice (an arguably determinate decision that follows causally from one's character, values, and especially feelings and desires at the moment of decision)"
  - N.B.: The "choices" are "free" from determination but not the "will"

Two-Stage Free Will: Chance Then Choice

- Two-stage theory (Doyle, 2010)
  - numerous advocates among philosophers and scientists, but especially
  - Poincaré, Popper, and Dennett, who all have also argued for a version of BVSR
  - e.g., Dennett (1978) use of Paul Valéry's "It takes two to invent anything. The one makes up combinations; the other one chooses, recognizes what is important to him in the mass of things which the former has imparted to him"
  - also used for BVSR (e.g. Simonton, 1988)
  - Hence, creativity an act of "Valerian free will"

Two-Stage Free Will: Chance Then Choice

- Reformulation in BVSR formalism:
  - *set X* now contains *k* choices
    - $x_1, x_2, x_3 \ldots x_i \ldots x_k$
  - $s_i = p_i u_i v_i$
    - freedom associated with choice x_i increases as s_i decreases (or as b_i increases)
  - $S = 1/k\ \Sigma p_i u_i v_i$
    - freedom associated with the set of choices in *X* increases as *S* decreases (or as *B* increases)

Two-Stage Free Will: Chance Then Choice

- Hence, two important implications
  - First, the "free will" associated with any given choice or with any given set of choices is also a quantitative variable that ranges from 0 to 1
    - Free will increases as k increases
      - more-choices condition
    - Free will increases as $p_i \rightarrow 1/k$ for all i
      - equiprobability condition

Two-Stage Free Will: Chance Then Choice

- Hence, two important implications
  - Second, because both s_i and S can approach 0 without the imposition of randomness or "chance," free will can be manifested in any systematic process or procedure that still retains the "decoupling" between the utility and prior knowledge of that utility
    - e.g., picking an undergraduate major

Two-Stage Creativity and Free Will

- To more directly integrate the two phenomena I must:
  - First, discuss the central circumstances that enhance creativity, circumstances that should support free will as well
  - Second, say something about how creative thoughts emerge in the first place, particularly if they are to be considered genuine acts of free will

Creative solutions, blindness, and freedom of choice

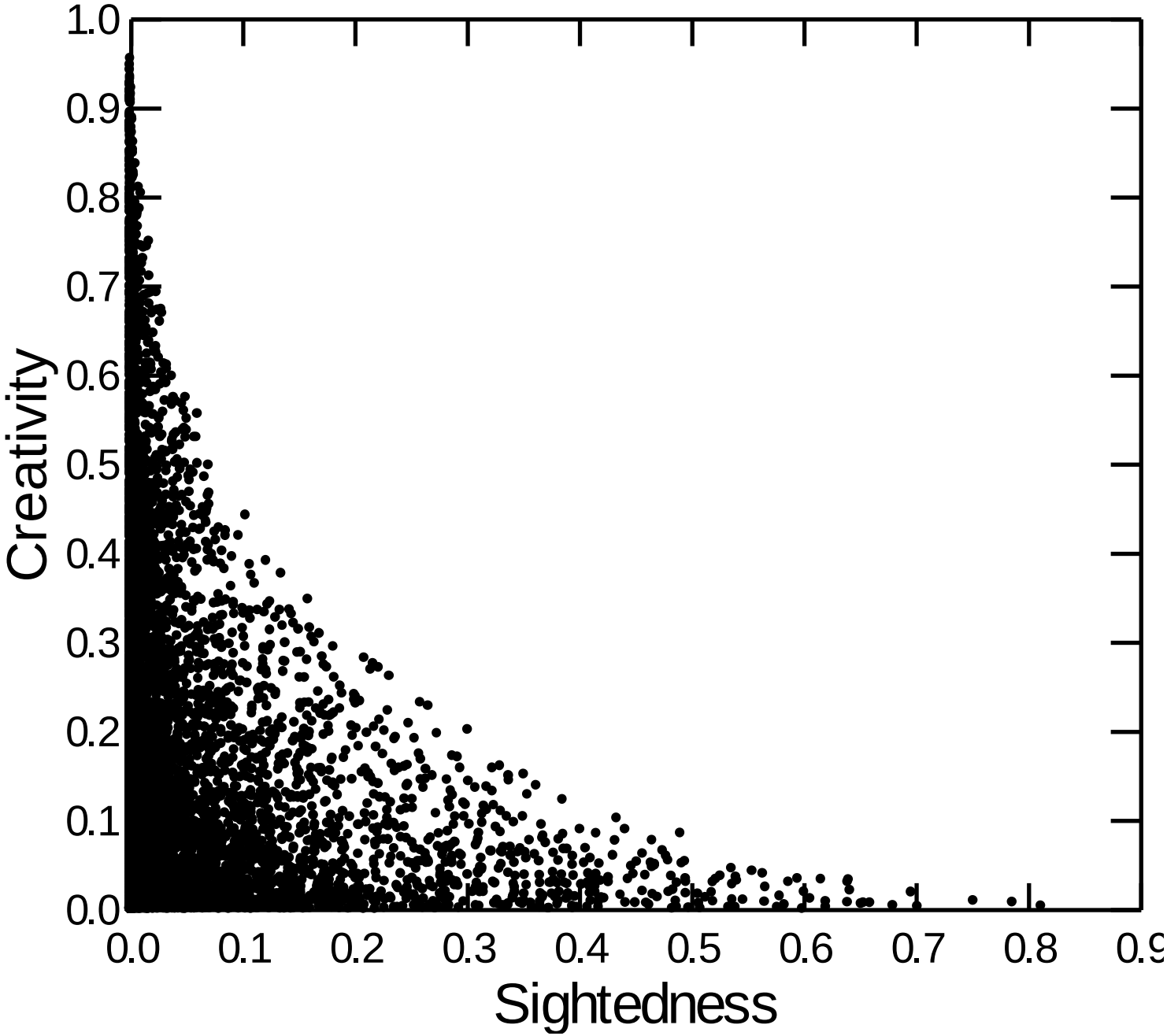
- Key contrast:
  - Where options are supposedly chosen to maximize utility (viz. rational choice)
  - Problem solutions may be selected to maximize creativity: tradeoffs possible
    - Hence, some utility may be sacrificed to maximize creativity
    - e.g., the pendulum solution to the two-strings problem
- So what maximizes creativity?

Creative solutions, blindness, and freedom of choice

- When sighted maximizes, then
  - as $s_i \rightarrow 1$, then $c_i \rightarrow 0$ for any i
  - as $S \rightarrow 1$, then $c_i \rightarrow 0$ for all i
  - i.e., regardless of the utility, highly sighted solutions and solution sets cannot be highly creative

Creative solutions, blindness, and freedom of choice

- When blindness maximizes, then
  - the expected value (M_c) of c_i increases,
  - the variance of c_i (σ_c) increases
  - the maximum possible creativity (or *c*-max) increases
  - the skewness of the joint creativity-sightedness distribution increases
  - all four increases at an accelerating rate, as seen in the following figure …


Creativity
Sightedness
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

Creative solutions, blindness, and freedom of choice

- If creativity maximizes at the blind end of the blind-sighted continuum,
- and if free will does as well,
- then it follows that creative solutions must represent acts of free will
- Both are equally contingent on the more-choice and equiprobability conditions

Creative ideas and volitional choices as combinatorial products

- Problem solving constitutes only a special case of creativity in general
- Hence, need a more general conception of creativity that includes problem solving as a special case
- That inclusive conception involves combinatorial processes
- Combinatorial can also provide *new* options beyond those provided

Creative ideas and volitional choices as combinatorial products

- Creativity as combination has two main assets:
  - First, this conception allows creativity to be analyzed using combinatorial models both mathematical and computational
    - These models provide the foundation for the first step of Valerian free will
    - These models often use pseudorandom number generators to simulate creative phenomena, introducing an *as if* chance

Creative ideas and volitional choices as combinatorial products

- Creativity as combination has two main assets:
  - Second, this conception has been linked with the cognitive processes, personal traits, developmental experiences, and environmental contexts associated with creative thought …

Creative ideas and volitional choices as combinatorial products

- Examples:
  - divergent thinking, rare associations; reduced latent inhibition, defocused attention, cognitive inhibition; openness to experience; psychoticism and stereotypy; multicultural experiences and bi- or multilingualism; and various novel, random, incongruous, or chaotic environmental stimuli
  - that all enable the production of ideas with low sightedness

Discussion

- From little-c to Big-C Creativity
- Creative genius as the "uncaused creator" whose choices freely initiate causal chains that would not have appeared otherwise in history
- These chains are manifested in
  - Productivity (Lotka, Price, etc.)
  - Impact (citations, awards, etc.)
  - Eminence (consensus, stability, etc.