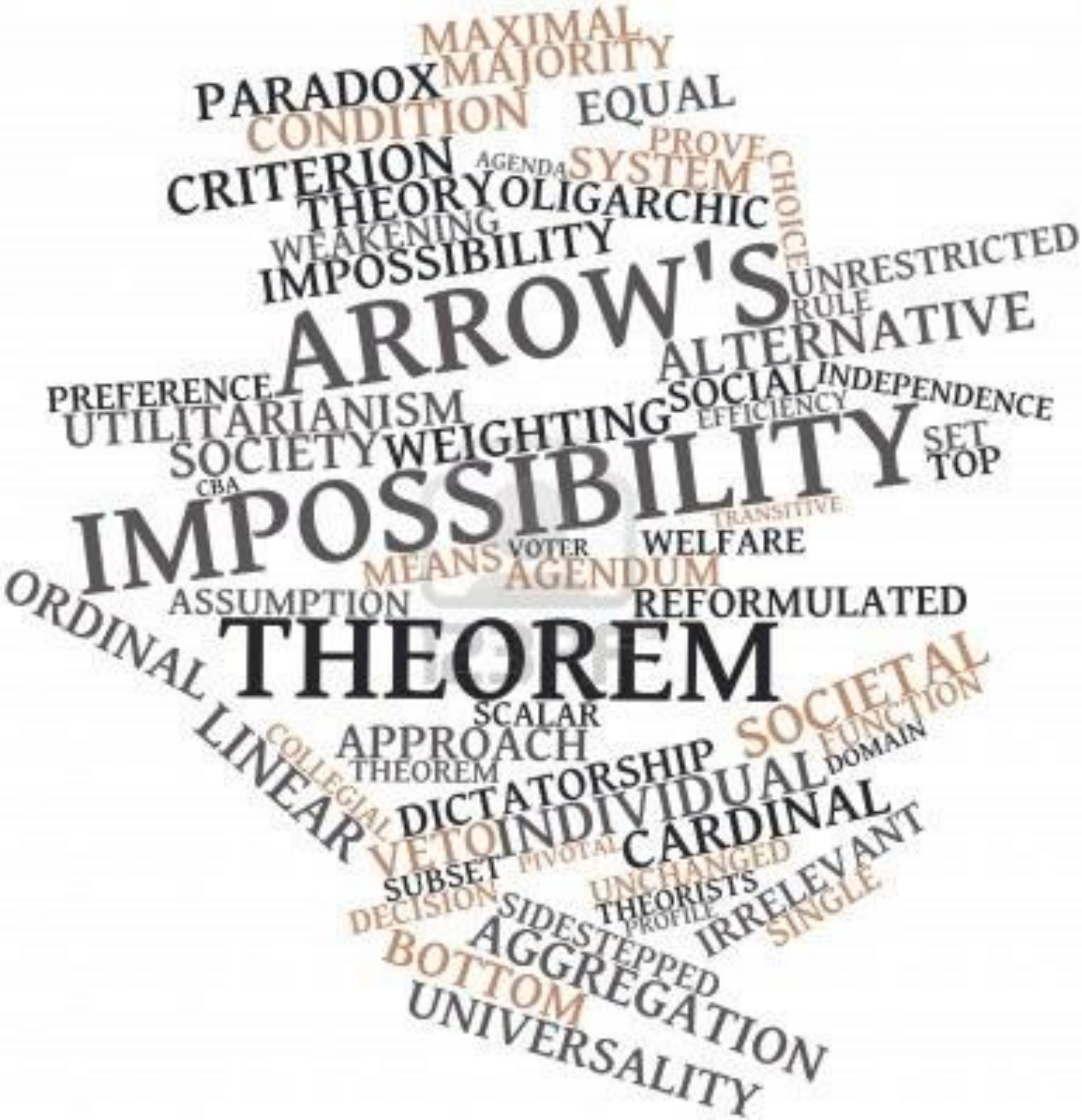
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ARROW'S
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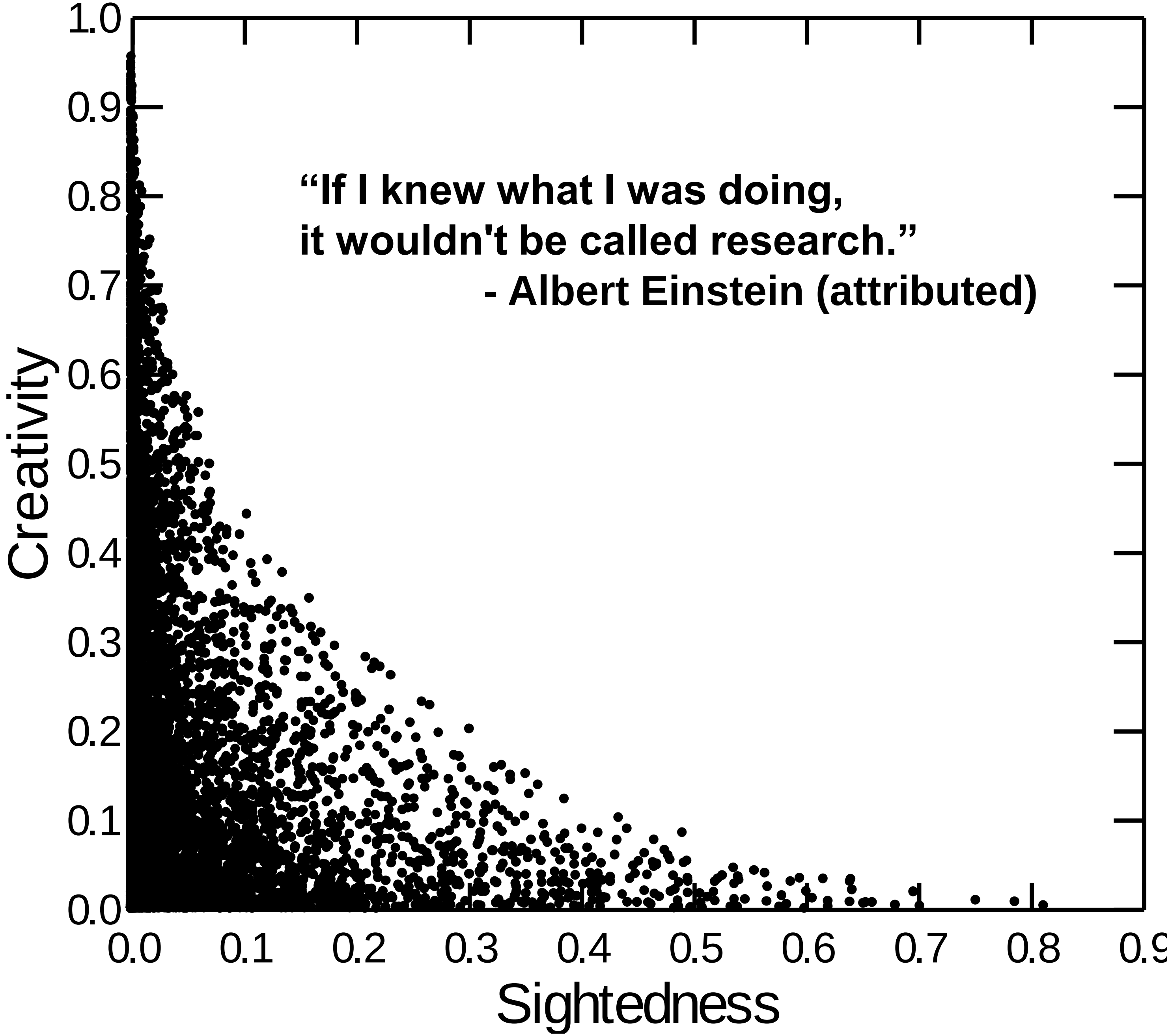
UNIVERSALITY



"If I knew what I was doing,
it wouldn't be called research."
- Albert Einstein (attributed)
Creativity
Sightedness
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

Creativity and Sightedness:

Why Creative Solutions Cannot be Sighted …
or, Why Blind Solutions Must Maximally Vary in Creativity

Introduction

- Blind-variation and selective-retention theory of creativity (BVSR; Campbell, 1960)
- Needless controversy because nobody defined either creativity or blindness
- Moreover, "blindness" is a concept that necessarily provokes misunderstanding
- Hence, the need to replace it with its inverse, namely "sightedness" (Sternberg, 1998)
- To illustrate, consider problem solving

Solution Parameters

- Set X of $k \geq 1$ potential solutions x_i, $i = 1 \ldots k$
- *Final utility* u_i, where $0 \leq u_i \leq 1$
  - e.g., the proportion of solution criteria satisfied
- *Initial probability* p_i, where $0 \leq p_i \leq 1$,
  - i.e., if $p_i = 0$, then not immediately available (but accessible after suitable priming stimuli)
- *Prior knowledge* v_i, where $0 \leq v_i \leq 1$
  - viz. how much the value of u_i is already known
  - e.g., via domain-specific expertise, such as “strong” or “algorithmic” methods

Maximally Sighted Solution

- **Sightedness** $s_i = u_i p_i v_i$, where $0 \le s_i \le 1$
  - If $s_i = 1$, then totally sighted
    - i.e., the solution is highly useful, highly probable, and it is known in advance that it will be highly useful
    - viz. “routine” or “reproductive” solutions
    - sighted solutions are homogeneous: $u_i = p_i = v_i = 1$
  - If $s_i = 0$, then totally unsighted
    - holds whenever $u_i = 0$, $p_i = 0$, and/or $v_i = 0$
    - hence, unsighted solutions are heterogeneous
  - N.B.: Blindness $b_i = 1 – s_i$

Maximally Creative Solution

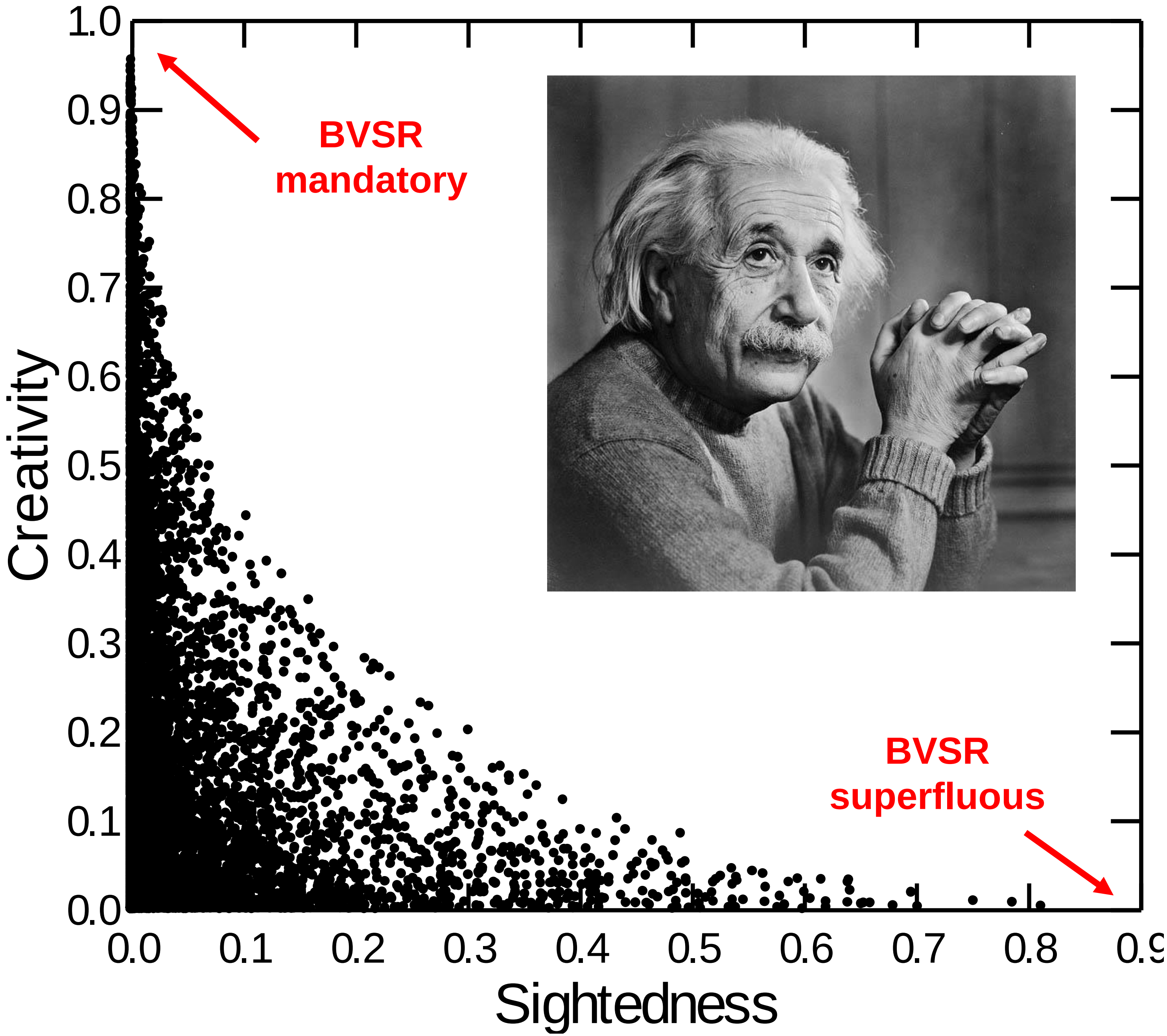
- **Creativity** $c_i = u_i (1 - p_i) (1 - v_i)$,
  - where $0 \leq c_i \leq 1$, and
  - $(1 - p_i)$ = originality (i.e., low probability)
  - $(1 - v_i)$ = surprisingness or “nonobviousness” (as in the third US Patent Office criterion)
- i.e., “productive” or “innovative” solutions
- N.B.: If $u_i = 0$, $p_i = 1$, or $v_i = 1$, then $c_i = 0$
  - Hence, when $s_i = 1$, $c_i = 0$
  - i.e., highly sighted solutions cannot be creative
- But what happens as $s_i \rightarrow 0$ (or as $b_i \rightarrow 1$)?

Minimally Sighted (Maximally Blind) Potential Solutions

- Their intrinsic heterogeneity:
  - Many contrasting parameter values yield $b_i = 1$
- Two key examples -
  - One: $u_i = 0$, $p_i = 1$, and $v_i = 0$,
    - e.g., cognitive biases or functional fixedness
    - e.g., Watson's original "like-with-like" DNA coding
  - Two: $u_i = 1$, $p_i = 0$, and $v_i = 0$,
    - BINGO!
    - viz. a maximally creative solution

Minimally Sighted (Maximally Blind) Potential Solutions

- In general, as $b_i \rightarrow 1$ (or $s_i \rightarrow 0$), the following increase at an accelerating rate:
  - the expectation M_c,
  - the variance σ_c^2, and
  - *c*-max: specifically, *c*-max $\rightarrow 1$
- Hence, the need for BVSR,
  - to winnow the wheat from the chaff,
  - especially because the biggest kernels are located where the chaff is most voluminous
  - as depicted in …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Creativity
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0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Sightedness
BVSR mandatory
BVSR superfluous