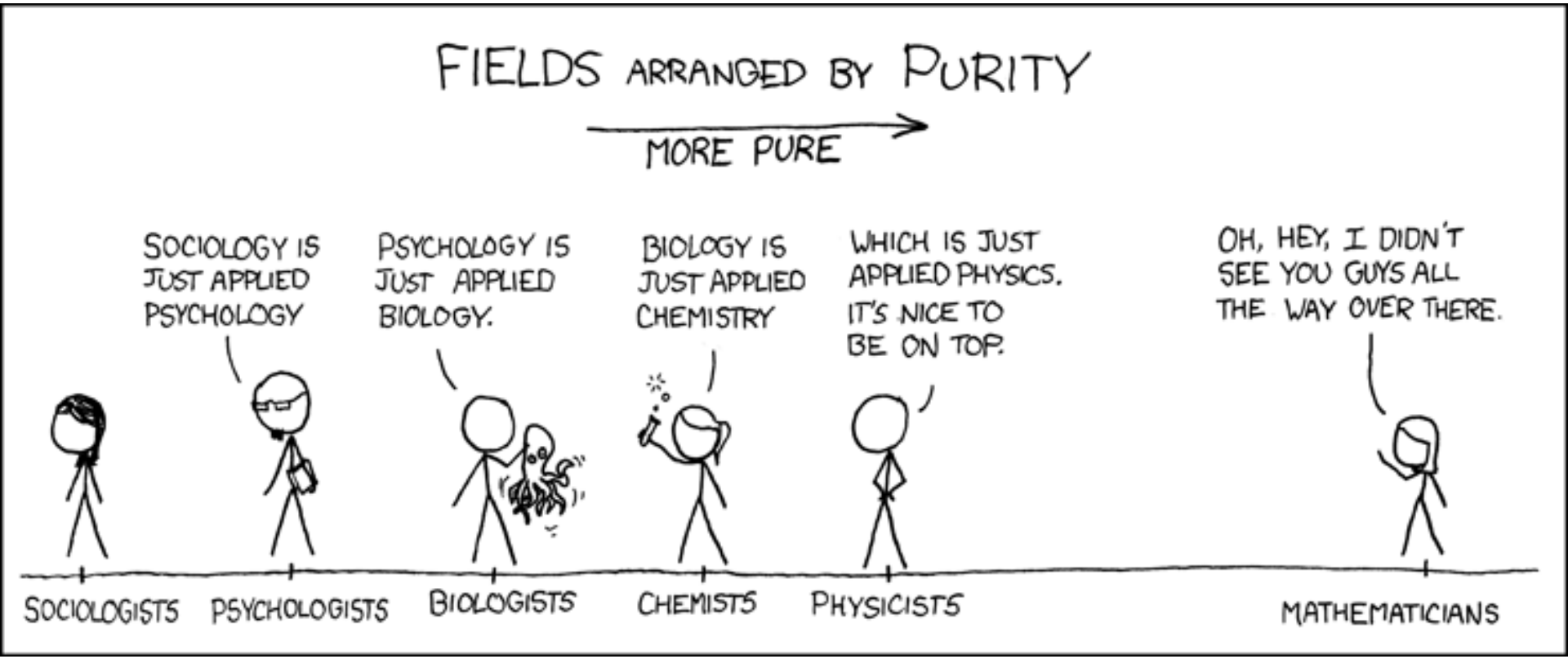

FIELDS ARRANGED BY PURITY
MORE PURE
SOCIOLOGY IS JUST APPLIED PSYCHOLOGY
PSYCHOLOGY IS JUST APPLIED BIOLOGY.
BIOLOGY IS JUST APPLIED CHEMISTRY
WHICH IS JUST APPLIED PHYSICS. IT'S NICE TO BE ON TOP.
OH, HEY, I DIDN'T SEE YOU GUYS ALL THE WAY OVER THERE.
SOCIOLOGISTS
PSYCHOLOGISTS
BIOLOGISTS
CHEMISTS
PHYSICISTS
MATHEMATICIANS

Creativity in the Arts and Sciences:

Contrasts in Disposition, Development, and Achievement

Three Arguments

- *First*, creativity is a
  - heterogeneous rather than homogeneous phenomenon: no “one-size fits all”
  - but a substantial proportion of this heterogeneity can be captured by a single dimension that extends from the sciences to the arts

Three Arguments

- *Second*, this single dimension is correlated with psychological traits and experiences of creators who practice in a given domain
- that is, these variables are
  - dispositional (e.g., personality), and
  - developmental (e.g., education)

Three Arguments

- *Third*, an individual's magnitude of creativity in a chosen domain corresponds at least in part with the fit between his/her
  - dispositional traits and
  - developmental experiences
- and those that are typical of that domain or some other domain along the same dimension

First Argument: Hierarchy of the Sciences

- Classic concept: Auguste Comte
  - astronomy
  - physics
  - chemistry
  - biology
  - sociology

First Argument: Hierarchy of the Sciences

- Contemporary concepts:
  - physical, biological, and social sciences
  - exact versus non-exact sciences
  - hard versus soft sciences
  - paradigmatic versus pre-paradigmatic sciences
  - natural versus human sciences
  - sciences, humanities, and the arts

First Argument: Hierarchy of the Sciences

- Empirical research:
  - Major scientific disciplines can be ordered along a single dimension using a large number of positive and negative indicators of “hardness”

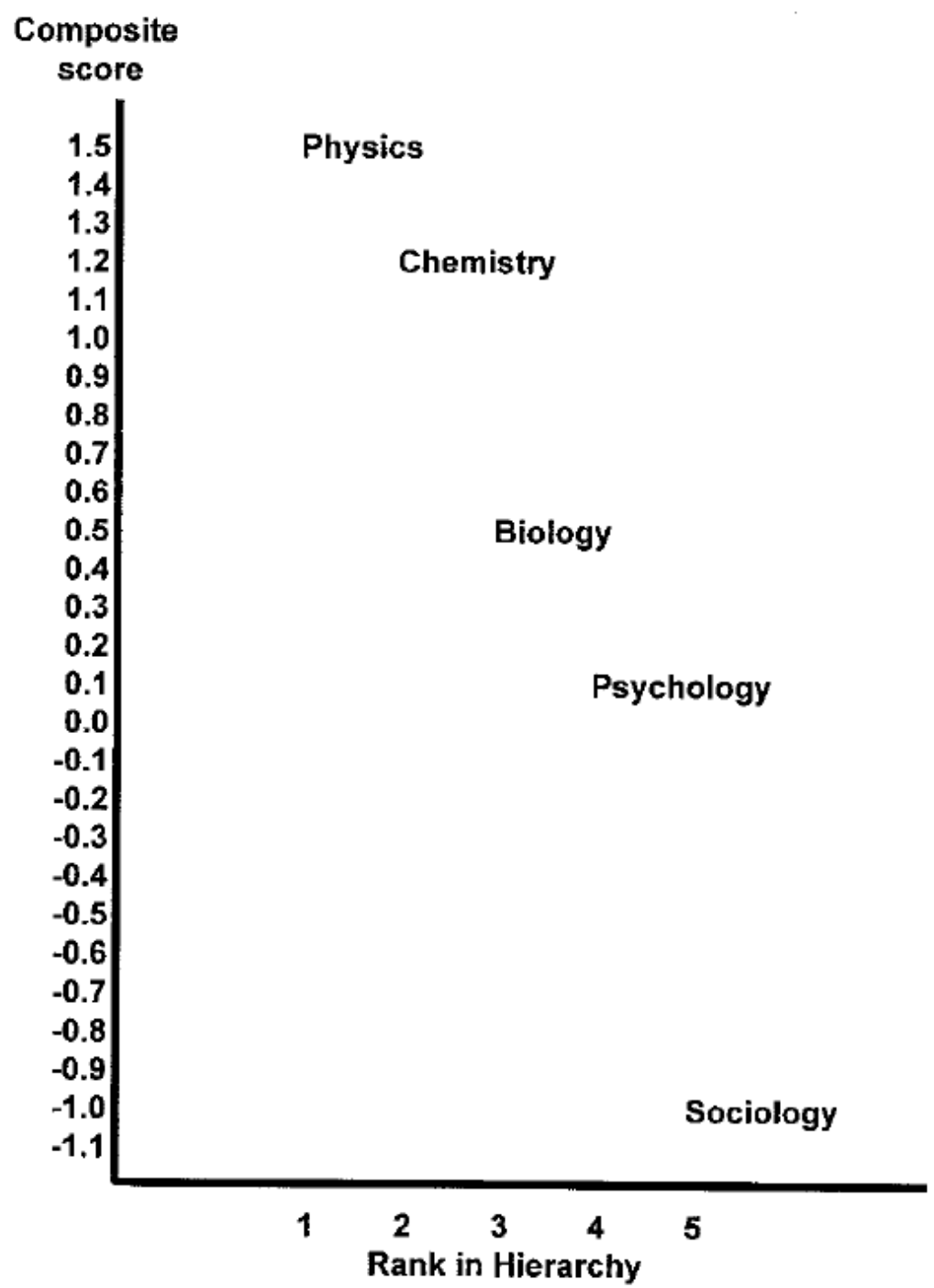
Positive indicators

- Peer evaluation consensus
- Citation concentration
- Early impact rate
- Citation immediacy
- Anticipation frequency
- Obsolescence rate
- Graph prominence
- Rated disciplinary hardness

Negative indicators

- Consultation rate
- Theories-to-laws ratio
- Age at receipt of Nobel prize
- Lecture disfluency

Yielding …


Composite score
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1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
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0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
Physics
Chemistry
Biology
Psychology
Sociology
1
2
3
4
5
Rank in Hierarchy

Two Elaborations

- Extrapolation beyond Scientific Domains
- Interpolation within Creative Domains

Two Elaborations

- One - This hierarchy can be *extrapolated* beyond scientific domains:
  - Scientific versus artistic creativity, where
  - creativity in the humanities falls somewhere between that in the sciences and the arts

Two Elaborations

- Illustrations using criteria previously applied in constructing scientific hierarchy:
  - Obsolescence rate:
    - psychology/sociology > history > English
  - Lecture disfluency:
    - psychology/sociology < political science < art history < English (cf. philosophy)

Two Elaborations

- Two - This hierarchy can be *interpolated* within creative domains:
  - Paradigmatic sciences in “normal” versus “crisis” stages (e.g., classical physics in middle 19th versus early 20th century)
  - Formal versus expressive arts (Apollonian versus Dionysian; Classical versus Romantic; linear versus painterly; etc.)
  - Non-paradigmatic sciences with contrasting theoretical/methodological orientations (e.g., the two psychologies)

Illustration: 54 Eminent Psychologists

- Objectivistic versus Subjectivistic
- Quantitative versus Qualitative
- Elementaristic versus Holistic
- Impersonal versus Personal
- Static versus Dynamic
- Exogenist versus Endogenist

54 Eminent Psychologists

- The six bipolar dimensions can be consolidated into a single bipolar dimension
  - “Hard,” “tough-minded,” “natural-science” psychology versus
  - “Soft,” “tender-minded,” “human-science” psychology
- Moreover, evidence that these two psychologies are distinct

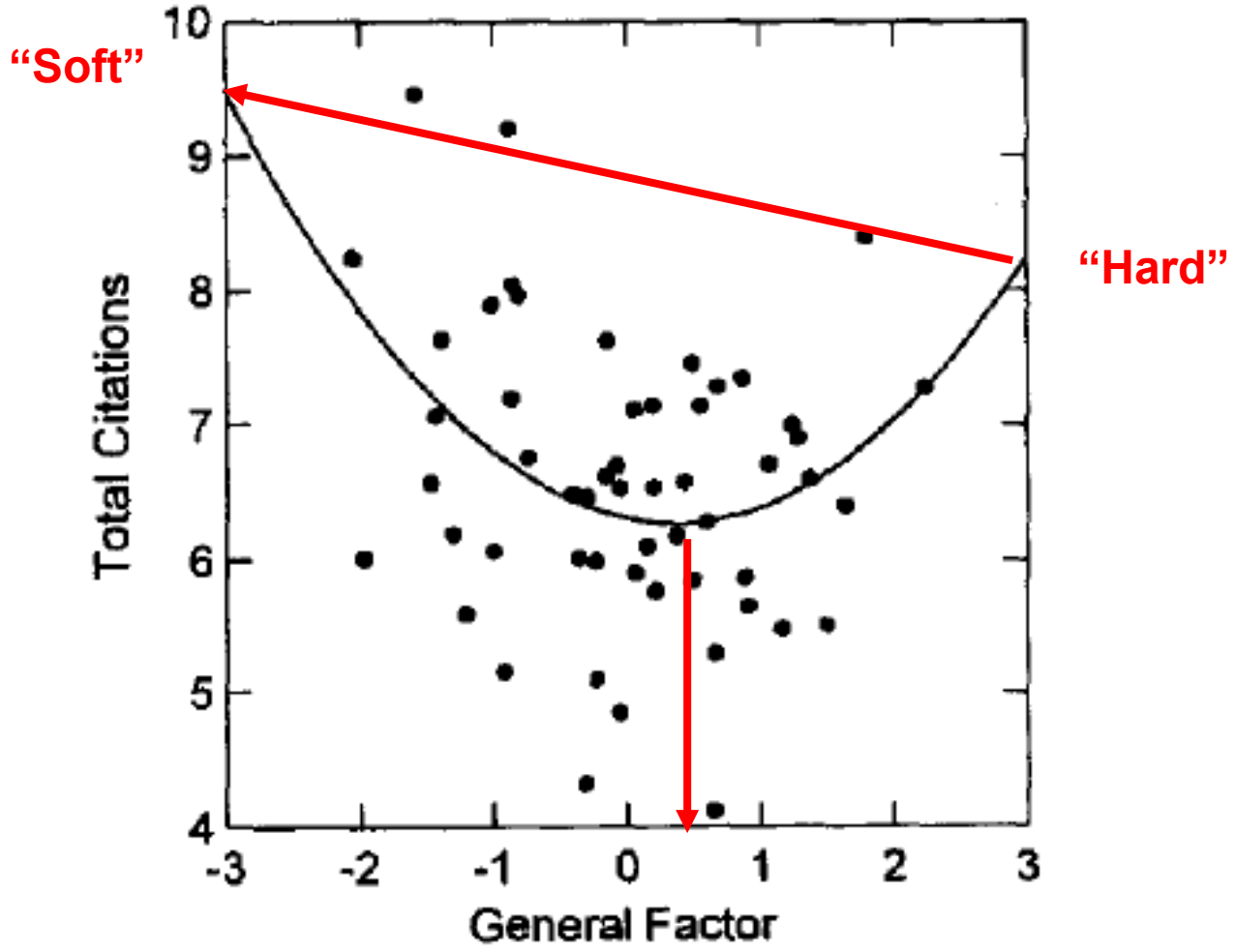


Figure 1. Scatterplot of the relation between the general factor and total citations for 54 eminent psychologists (see Appendix for raw scores). Also shown is the best-fitting quadratic function defining the curvilinear backward-J curve describing the association between the two variables.

Second Argument

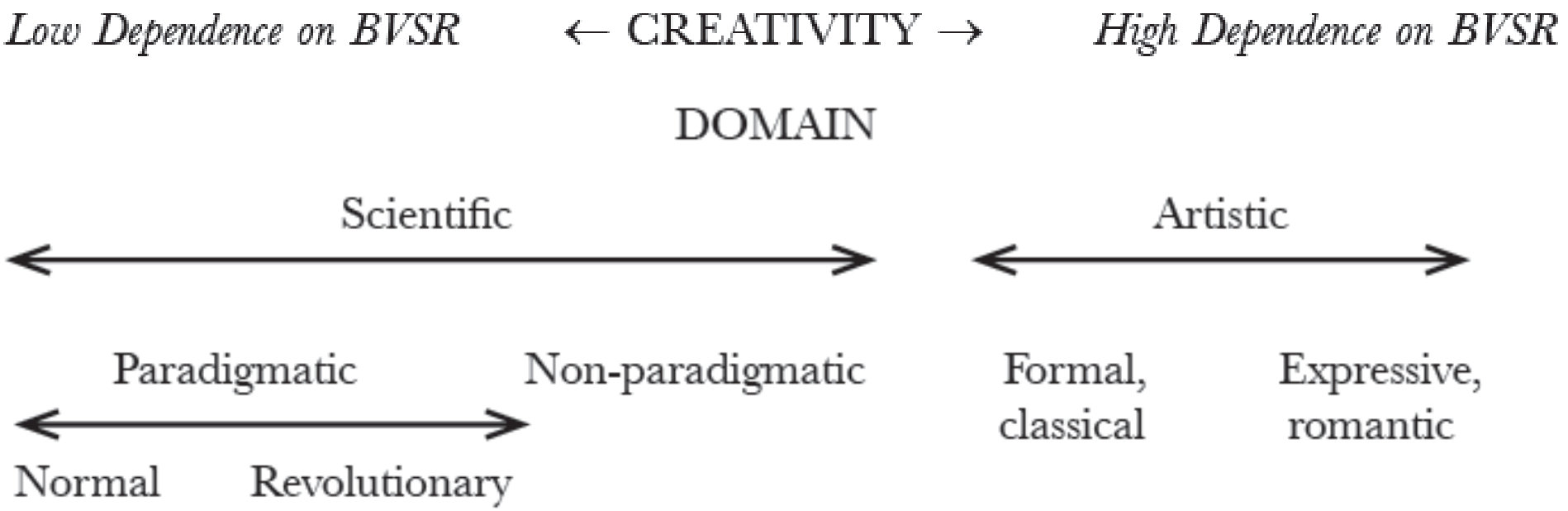
- Creators working in different disciplines should display dispositional traits and developmental experiences that correspond to the chosen domain's placement along the single dimension
- That is, at least to some extent the dimension should have a psychological basis because there should be a partial match between discipline and disposition/development

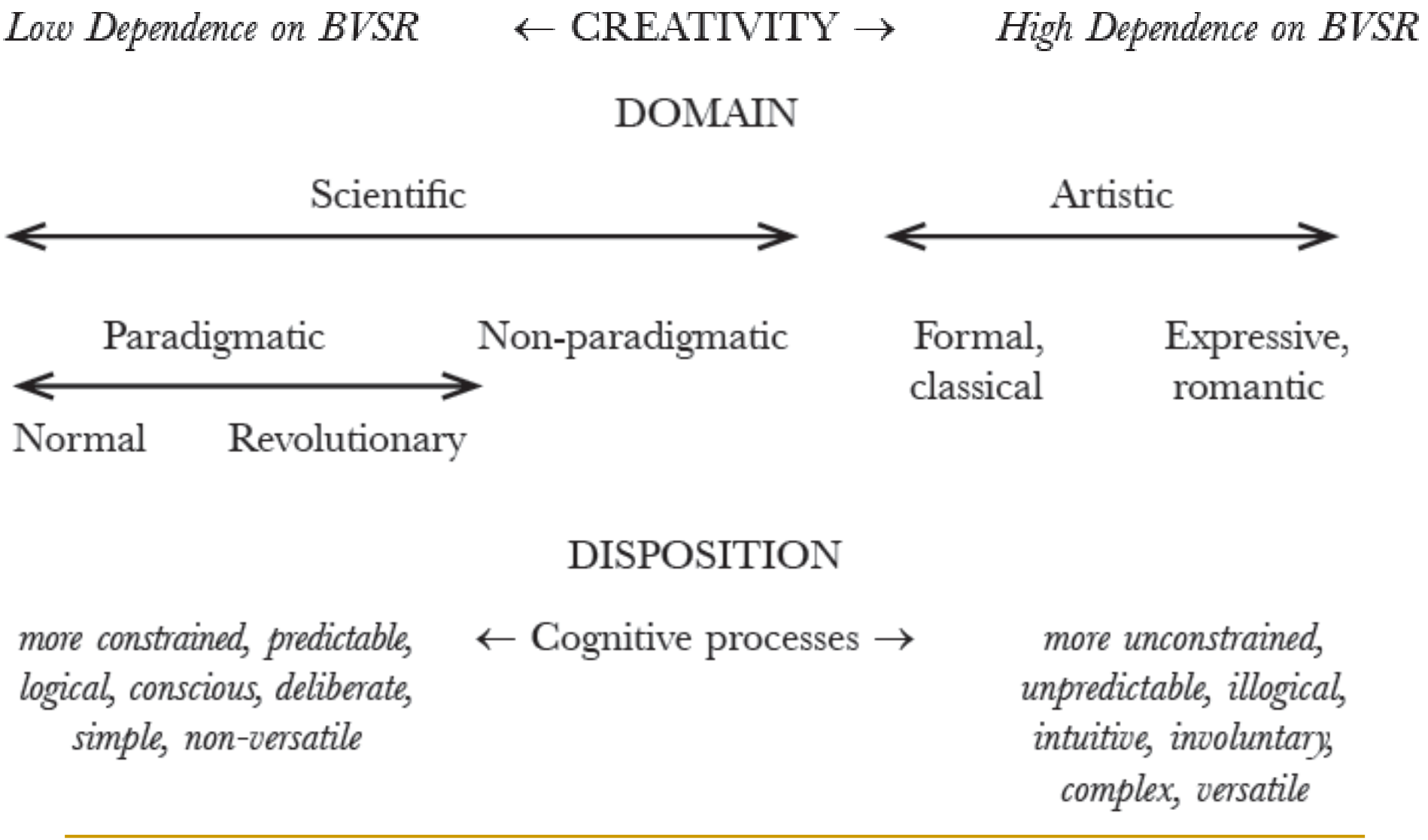
What Dispositional and Developmental Factors Determine Preferences Regarding

- Consensus versus Dissent?
- Collectivism versus Individualism?
- Constraint versus Freedom?
- Objectivity versus Subjectivity?
- Logic versus Intuition?
- Exactness versus Ambiguity?
- Formality versus Informality?
- Rationality versus Emotion?
- Algorithms versus Heuristics?

Or, in terms of the BVSR theory of creativity

- Low dependence on BVSR
- versus
- High dependence on BVSR?
- where BVSR =
- Blind variation and selective retention
- that is, the variant probabilities are decoupled from their likelihoods of proving successful


Low Dependence on BVSR
← CREATIVITY →
High Dependence on BVSR
DOMAIN
Scientific
Artistic
Paradigmatic
Non-paradigmatic
Formal, classical
Expressive, romantic
Normal
Revolutionary


Low Dependence on BVSR
← CREATIVITY →
High Dependence on BVSR
DOMAIN
Scientific
Artistic
Paradigmatic
Non-paradigmatic
Formal, classical
Expressive, romantic
Normal
Revolutionary
DISPOSITION
more constrained, predictable, logical, conscious, deliberate, simple, non-versatile
← Cognitive processes →
more unconstrained, unpredictable, illogical, intuitive, involuntary, complex, versatile

Low Dependence on BVSR ← CREATIVITY → *High Dependence on BVSR*

DOMAIN

Scientific ↔ Artistic

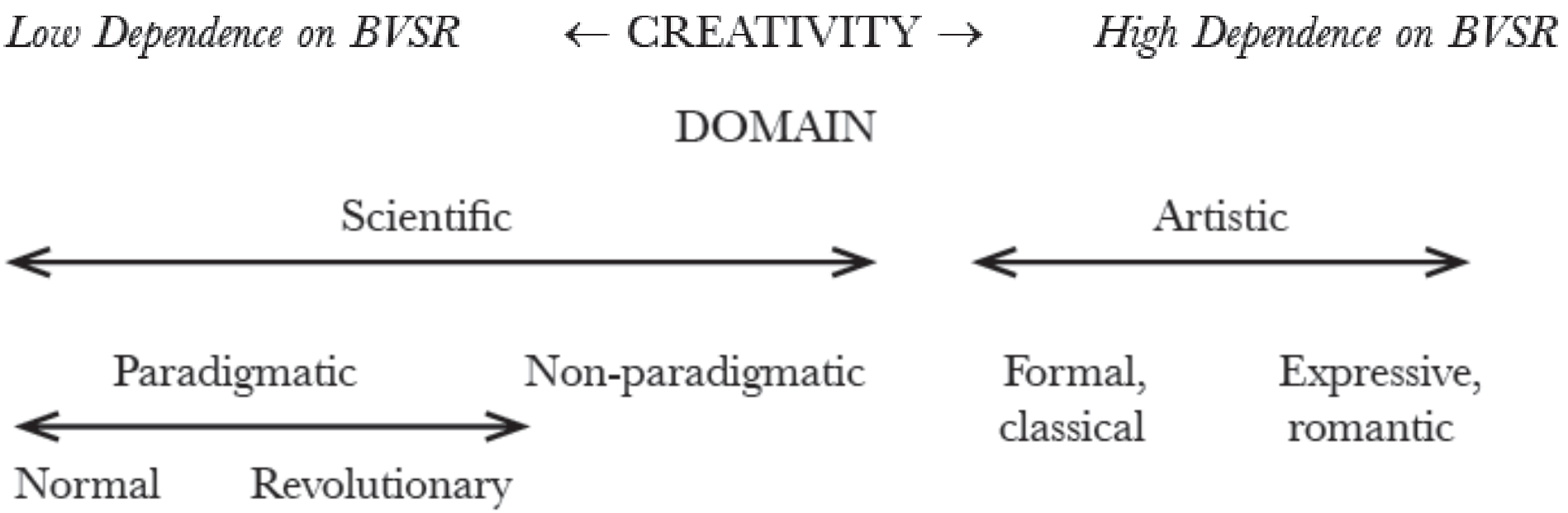
Paradigmatic ↔ Non-paradigmatic

Normal ↔ Revolutionary

Formal, classical ↔ Expressive, romantic

DISPOSITION

more restricted, focused attention, fewer interests, serendipity rare ← Openness to experience → *more unrestricted, defocused attention, many diverse interests, serendipity common*


Low Dependence on BVSR
← CREATIVITY →
High Dependence on BVSR
DOMAIN
Scientific
Artistic
Paradigmatic
Non-paradigmatic
Formal, classical
Expressive, romantic
Normal
Revolutionary
DISPOSITION
lower incidence rate, less severe symptoms
← Psychopathology →
higher incidence rate, more severe symptoms

Illustrations

Magnification	Professional Categories				
x 1	SCIENCES			<	ARTS
x 2	NATURAL SCIENCES			<	SOCIAL SCIENCES
x 2	FORMAL ARTS	<	PERFORMING ARTS	<	EXPRESSIVE ARTS
x 3	NONFICTION	<	FICTION	<	POETRY
x 4	FORMAL STYLE	<	SYMBOLIC STYLE	<	EMOTIVE STYLE

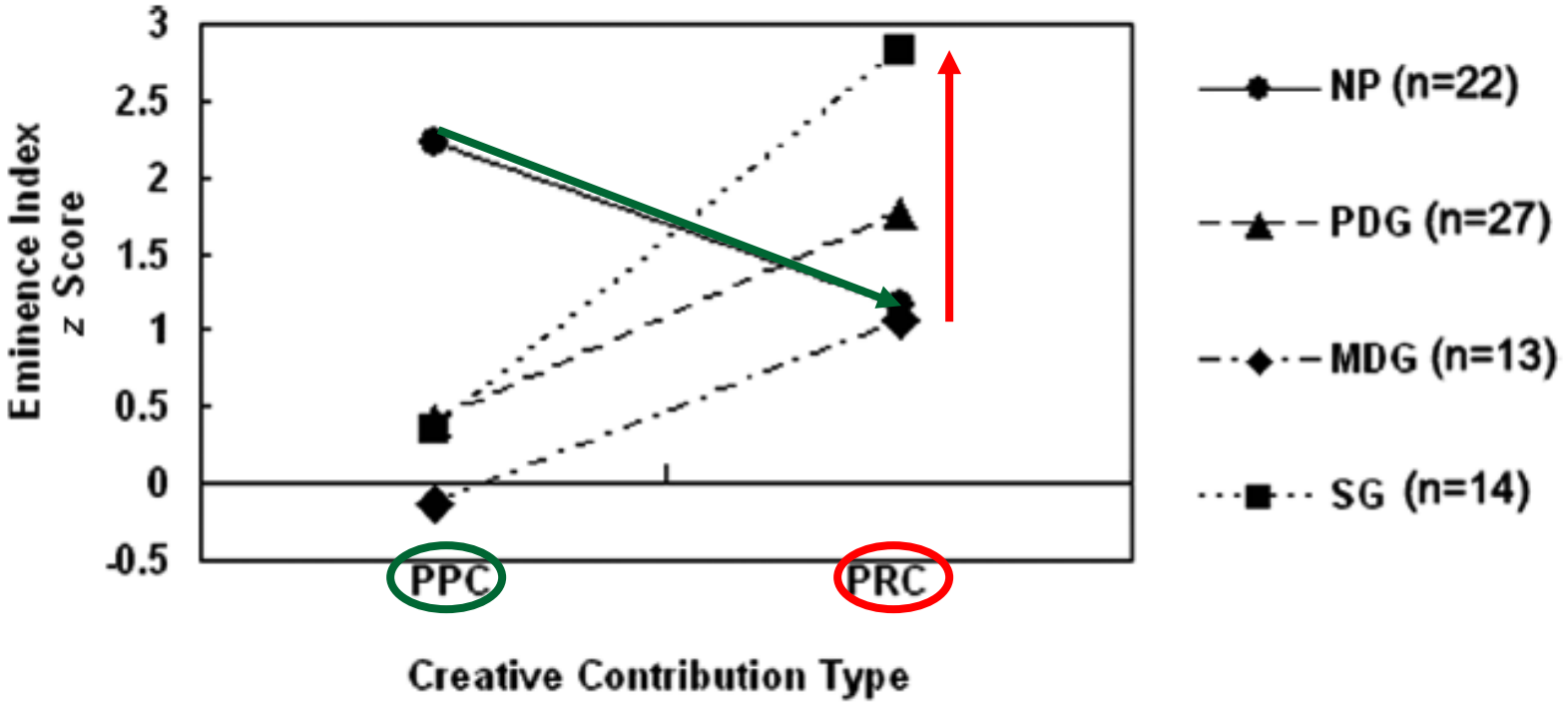


FIGURE 1 Interaction effects between creative contribution type and group. NPG = No Psychopathology Group, PDG = Personality Disorders Group, MDG = Mood Disorders Group, SG = Schizophre-Schizophrenia Group, PPC = paradigm preserving contributions, PRC = paradigm rejecting contributions.

Low Dependence on BVSR ← CREATIVITY → *High Dependence on BVSR*

DOMAIN

Scientific ⟷ Artistic

Paradigmatic ⟷ Non-paradigmatic

Formal, classical — Expressive, romantic

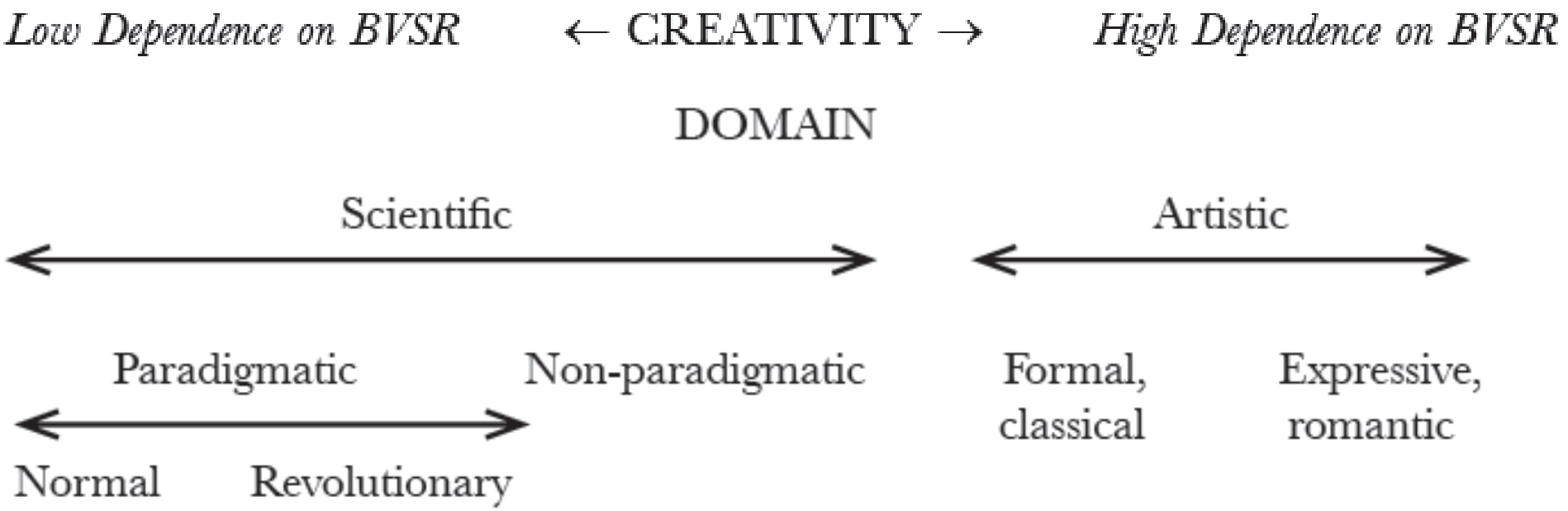
Normal — Revolutionary

DEVELOPMENT

more conventional, stable, homogeneous ← Home environment → *more unconventional, unstable, heterogeneous*

Illustration

- Family background of Nobel laureates (omitting physiology or medicine):
  - Father academic professional: physics 28%, chemistry 17%, literature 6%
  - Father lost by age 16: physics 2%, chemistry 11%, literature 17%
  - 30% of latter “lost at least one parent through death or desertion or experienced the father’s bankruptcy or impoverishment” whereas “the physicists, in particular, seem to have remarkably uneventful lives”


Low Dependence on BVSR
← CREATIVITY →
High Dependence on BVSR
DOMAIN
Scientific
Artistic
Paradigmatic
Non-paradigmatic
Formal, classical
Expressive, romantic
Normal
Revolutionary
DEVELOPMENT
more likely firstborn
← Birth order →
more likely later born

Low Dependence on BVSR ← CREATIVITY → *High Dependence on BVSR*

DOMAIN

Scientific ⟷ Artistic

Paradigmatic ⟷ Non-paradigmatic

Normal Revolutionary

Formal, classical

Expressive, romantic

DEVELOPMENT

superior grades, more formal training, less likely marginal ← Education and training → *inferior grades, less formal training, more likely marginal*

Low Dependence on BVSR ← CREATIVITY → *High Dependence on BVSR*

DOMAIN

Scientific ⟷ Artistic

Paradigmatic ⟷ Non-paradigmatic

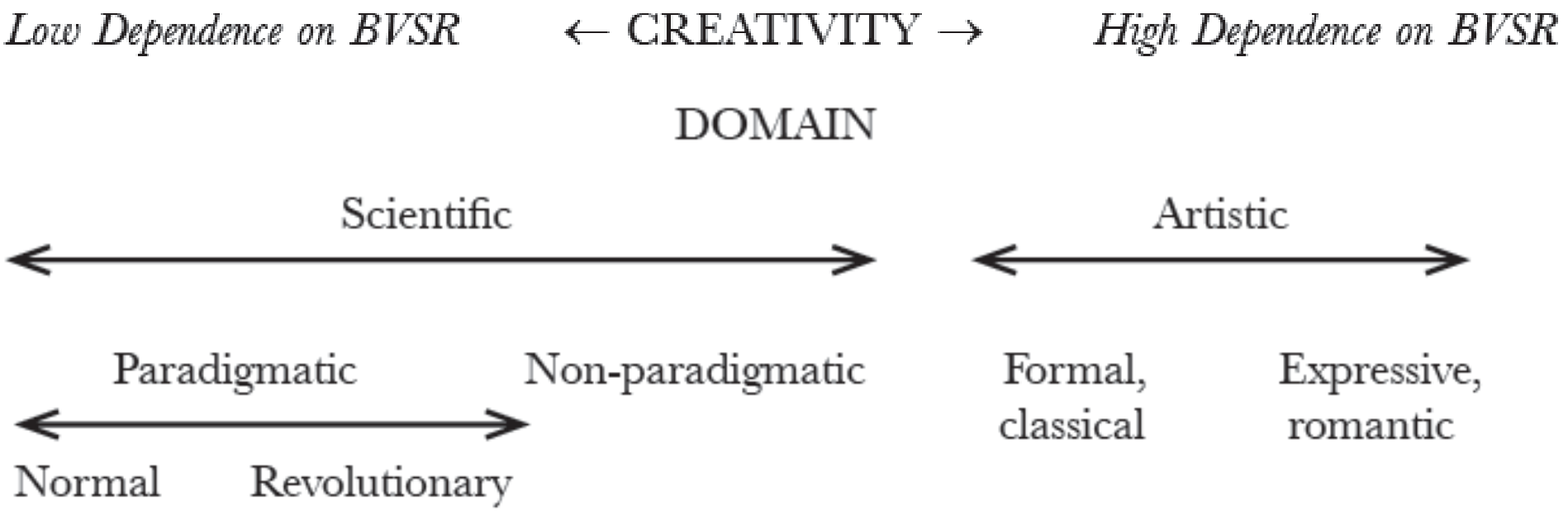
Normal Revolutionary

Formal, classical

Expressive, romantic

DEVELOPMENT

fewer, more homogeneous ← Mentors and role models → *more numerous, heterogeneous*



DEVELOPMENT

more politically stable, culturally uniform ← Sociocultural *Zeitgeist* → *more politically unstable, culturally diverse*

Third Argument: Differential Impact Within a Domain

- Some traits/experiences that determine an individual's disciplinary preference may also determine his or her disciplinary impact
- There are three main possibilities:

Third Argument: Differential Impact Within a Domain

- *First*, the most successful creators may be those whose dispositional traits and developmental experiences put them closest to the disciplinary centroid
  - i.e., “domain-typical” creator
  - e.g., stasis or equilibrium due to optimization of domain-disposition/development relationship
- The lower-impact creator will be peripheral relative to this centroid, either above or below

Third Argument: Differential Impact Within a Domain

- *Second*, the most successful creators may be those whose dispositional traits and developmental experiences put them closer to the centroid for disciplines more advanced in the hierarchy
  - i.e., “domain-progressive” creators
  - e.g., behavior geneticists, cognitive neuroscientists, and evolutionary psychologists within psychology
  - viz. the “reductionists”

Third Argument: Differential Impact Within a Domain

- *Third*, the most successful creators are those whose dispositional traits and developmental experiences put them closer to the centroid for a discipline lower down in the hierarchy
  - i.e., “domain-regressive” creators
  - e.g., scientific creativity as contingent on “regression” toward artistic creativity
  - cf. old psychoanalytic theory of creativity as “regression in service of the ego”

Third Argument: Differential Impact Within a Domain

- Empirical data indicate that the third option may apply to the most dispositional and developmental predictors
- That is, the most eminently creative figures in a given domain are more similar to more average creators lower down in the disciplinary hierarchy

Illustration

- Avocational interests and hobbies:
  - Scientific creativity positively associated with involvement in the arts:
    - Nobel laureates >
    - RS & NAS >
    - Sigma Xi & US public

Quotations

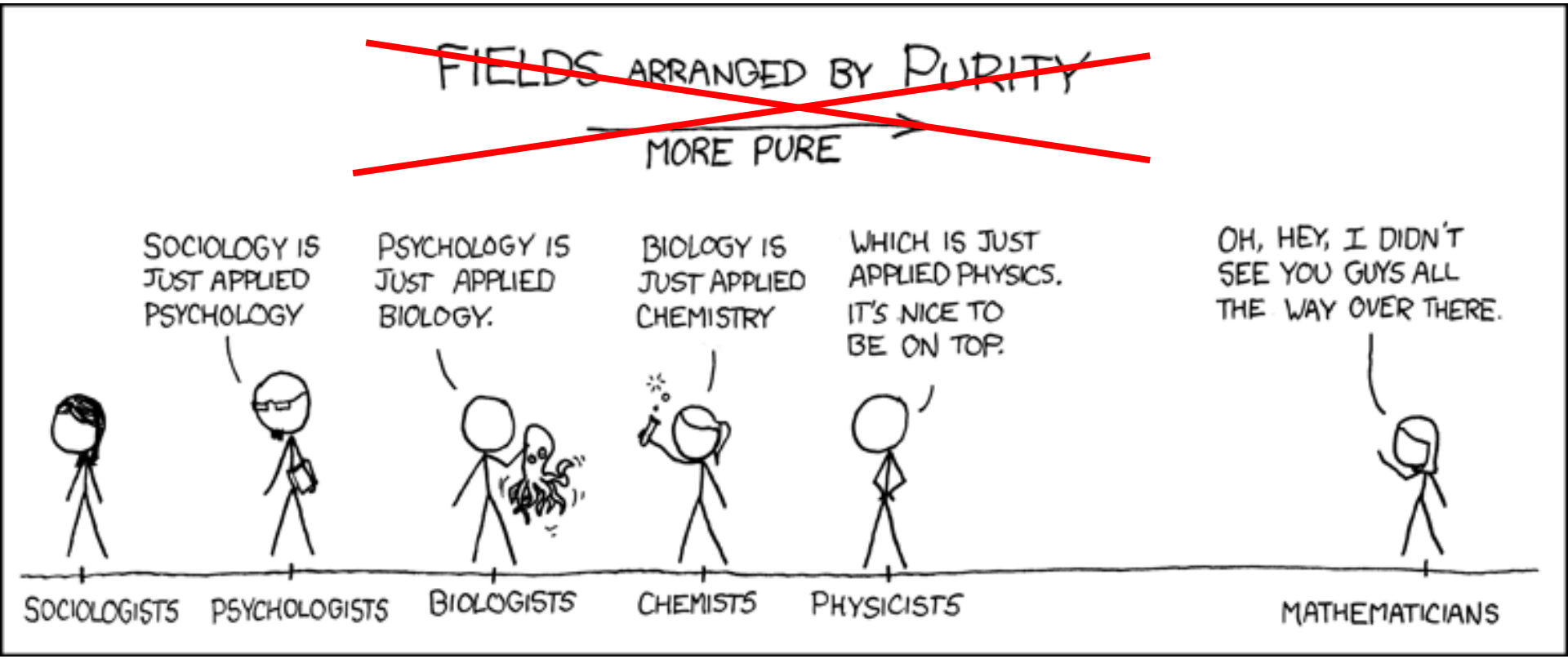
- Albert Einstein: “to these elementary laws there leads no logical path, but only intuition, supported by being sympathetically in touch with experience.”
- Max Planck: creative scientists “must have a vivid intuitive imagination, for new ideas are not generated by deduction, but by an artistically creative imagination.”

Conclusion

- Thus the need to invert and redefine the hierarchy?

FIELDS ARRANGED BY CREATIVITY

← MORE CREATIVITY



FIELDS ARRANGED BY CREATIVITY

← MORE CREATIVITY