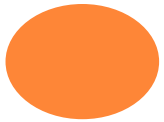
daily
great
inventive
imaginative
new
inspiring
use
creativity
original
every
love
today
things
flow
thinking
creative
day
life
ways
artistic
inspiration
problems
make
welcome
easily
come
find
unlimited
exercise
imagination
inspired
energy
innovative
always
ideas
solutions
work
talents
whenever
mind

Defining Creativity

Don’t We Also Need to Define What’s *Not* Creative?

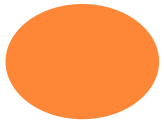
The Importance of Defining Our Terms: What Does "Creativity" Actually Mean?

- Presumably creativity must involve the "creative idea"
  - A creative process or (procedure) generates creative ideas
  - A creative person uses a creative process (or procedure) to generate those ideas
  - A creative product provides a vehicle for communicating those ideas to others
- But without a rigorous definition of the creative idea, scientific research on the process, person, and product becomes impossible:
  - You can't measure something when you have absolutely no conception of what you're actually measuring!
- Unfortunately, creativity researchers have not yet reached a consensus on what creativity actually means (e.g., Plucker, Beghetto & Dow, 2004, p. 89).
- Even worse, the most common definitions are a complete mess!



Four Questions that *Must* be Addressed in any Definition of Creativity

- How many criteria?
  - Two or three?
- What are the criteria?
  - Originality, novelty, or uniqueness?
  - Utility, usefulness, adaptiveness, appropriateness, relevance, effectiveness, meaningfulness, or value?
  - Surprise, nonobviousness, or heuristic rather than algorithmic task?
- How are the criteria assessments scaled?
  - Qualitative? Quantitative? If latter, how scaled?
- How are the criteria assessments integrated?
  - Additive? Multiplicative?
- Who assesses the criteria?
  - Personal assessment? Consensual assessment?

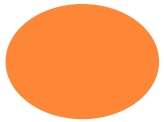


Illustrations of Prior Definitions

- Two-criteria definitions
  - The “standard definition,” namely, “Creativity requires both **originality and effectiveness**” (Runco & Jaeger, 2012, p. 92)
  - Bruner’s (1962) “effective surprise” (p. 18), or **surprising and effective**
  - Weisberg’s (2015) “intentional novelty,” or **novel and intentional**
  - Cf. Kaufman & Sternberg’s (2010) “a creative response is novel, good, and relevant’’ (p. xiii), which *splits* the second criterion into two criteria

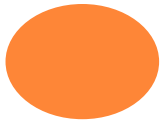
Illustrations of Prior Definitions

- Three-criteria definitions
  - Boden's (2004) **novel, valuable, and surprising**
  - US Patent Office's **new, useful, and nonobvious**
  - Cf. Amabile's (1996) "a product or response will be judged as creative to the extent that (a) it is both a novel and appropriate, useful, correct, or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic" (p. 35), which *lumps* the first two criteria into one criterion and then adds the third, which closely parallels surprising or nonobvious



Illustrations of Prior Definitions

- Problems with all of the foregoing definitions: None are explicit about
  - whether the criteria are quantitative or qualitative
  - whether the assessments of the criteria are to be integrated using either additive or multiplicative integration
  - whether the criteria assessments are personal or consensual
- Hence, the necessity for a definition that explicitly deals with these additional issues as well as specifies the nature and number of the criteria

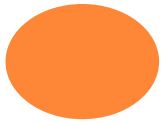


Prologue to the Proposed Definition

- The proposed definition will be founded on pure logic to render the most rigorous definition possible
- In particular, the definition will *not* depend on either …
  - Data (cf. Diedrich, Benedek, Jauk, & Neubauer, 2015, who concluded that novelty was more important than usefulness according to undergraduate participants) or the
  - Dictionary (cf. Weisberg, 2015, who argued on this basis that value is useless)
- Instead, the definition will depend solely on the parameters that are absolutely essential to fully describe any person's response to a given situation, such as a solution to a particular problem (whether a thought or a behavior)
- Those parameters must be defined first, then creativity will follow

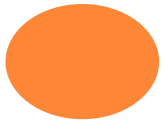
The Three Parameters Delineating a Person's Response to a Given Situation:

- The response's *initial probability p*, where $0 \leq p \leq 1$
  - Also may be called the "initial response strength"
  - Can be used to define the response's *originality*, which equals $(1 - p)$
- The response's *final utility u*, where $0 \leq u \leq 1$
  - If *u* is dichotomous, then $u = 0$ if useless and $u = 1$ if useful
  - If *u* is continuous, then *u* indicates (a) the *probability* of acceptance, (b) the *proportion* of criteria satisfied, or (c) the *benefit-cost ratio* scaled to a 0-1 metric (depending on the task demands), where $u < 1$ suggests *satisficing*
  - Here "final" means the utility after the response is generated and tested
- The utility's *prior knowledge value v*, where $0 \leq v \leq 1$ once more
  - Can be used to define response *surprise*, which equals $(1 - v)$
  - i.e., $(1 - v) = 1$ = "surprising," $(1 - v) = 0$ = "obvious," $(1 - v) \approx .5$ = "hunch"



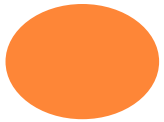
Two Critical Parameter Characteristics

- First, all three parameters can assume independent values
  - To illustrate,
    - if $u = 0$, then still $0 \leq v \leq 1$ (response *uselessness* may or may not be known in advance)
    - if $u = 1$, then still $0 \leq v \leq 1$ (response *usefulness* may or may not be known in advance)
  - However, given the three parameters together, then two rational constraints result
    - If $v \rightarrow 1$ and $u \rightarrow 0$, then $p \rightarrow 0$ (i.e., known useless responses get low probabilities)
    - If $v \rightarrow 1$ and $u \rightarrow 1$, then $p \rightarrow 1$ (i.e., known useful responses get high probabilities)
    - where "→" indicates "approaches" or "nears"



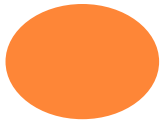
Two Critical Parameter Characteristics

- Second, all three parameters are *personal* rather than *consensual*
  - In particular, the utility *u* does *not* require the direct endorsement by others, a consensual process that involves so many interpersonal, social, cultural, economic, political, ideological, and historical factors that *consensual* creativity would cease to be *psychological* (cf. Csikszentmihályi, 2014; Weisberg, 2015)
    - E.g., the so-called “neglected” or “rediscovered” genius (such as Emily Dickinson)
  - Even so, to the extent that persons have acquired sufficient domain-specific expertise in a high-consensus field the correspondence between personal and consensual appraisals will be fairly high (Simonton, 2013, 2015)
    - E.g., peer review in the natural sciences (such as Albert Einstein)



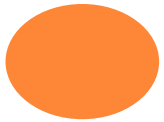
Response Personal Creativity Defined

- Given the foregoing three parameters, a response's *personal* (or "little c") *creativity* is defined as $c = (1 - p)u(1 - v)$, where $0 \leq c \leq 1$
  - In words, personal creativity is a multiplicative function (or "joint product") of originality, utility, and surprise
  - Hence, personal creativity is absent if $c = 0$, but maximal if $c = 1$, creativity most often assuming values in more middling ranges
    - E.g., if $p = .2$, $u = .8$, and $v = .5$, then $c = (1 - .2)(.8)(1 - .5) = .32$ ($1/3^{rd}$ up the scale)
  - Moreover, because the three criteria undergo a multiplicative rather than additive integration, each factor retains "veto power" over the others (i.e., in logical terms, each factor is necessary but not sufficient):
    - commonplace, useless, and/or obvious responses cannot be creative, period
    - additive integration (e.g., just averaging the three factors) lacks this property
      - E.g., a hot air balloon made out of steal reinforced concrete (additive $c = 1/3^{rd}$ up the scale)



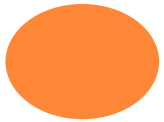
The Definition's Critical Implications: Each Parameter Taken Separately

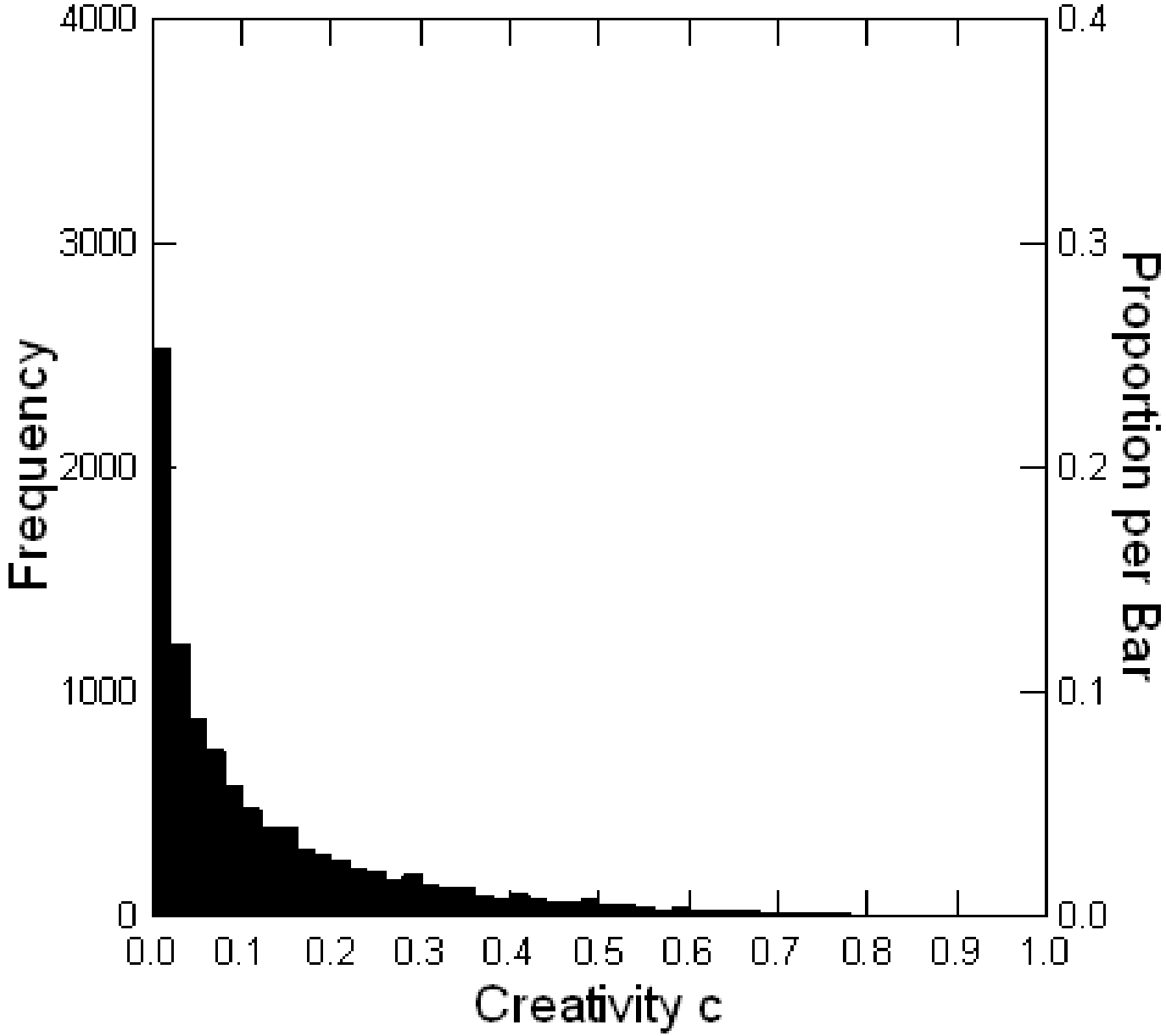
- Because $c \rightarrow 1$ as $p \rightarrow 0$, then whenever $u > 0$ and $v < 1$, then creativity maximizes when $p = 0$ (i.e., the response is not immediately available)
  - Thus, maximally creative responses require an incubation period
  - However, the length of the incubation period is unrelated to creativity
- Because $c \rightarrow 1$ as $v \rightarrow 0$, then whenever $u \rightarrow 1$ and $p \rightarrow 0$, then maximal personal creativity requires the implementation of BVSR processes or procedures (i.e., blind variation and selective retention; Campbell, 1960):
  - After all, $v \rightarrow 0$ indicates the extent to which the person is *blind* to u, thus requiring a generation and test or trial and error episode to determine u
  - *Any* process or procedure that supports implicit or explicit BSVR is potentially creative
  - In other words, there's no such thing as *the* creative process or procedure, only alternative strategies for producing potentially creative ideas



The Definition's Critical Implications: The Three Parameters Taken Jointly

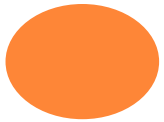
- First, the distribution of *c* must be highly skewed, low creativity responses far more frequent than high creativity responses
  - The distribution best described by an inverse-power function
  - E.g., a Monte Carlo simulation (Simonton, 2012)




4000
3000
2000
1000
0
Frequency
0.4
0.3
0.2
0.1
0.0
Proportion per Bar
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Creativity c

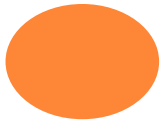
The Definition's Critical Implications: The Three Parameters Taken Jointly

- Second, although the high creative responses form a homogeneous group, all being original, useful, and surprising, the low *c* responses form an extremely heterogeneous group, with *seven* alternative ways of being uncreative
  - Cf. Leo Tolstoy's opening to his novel *Anna Karenina*: "All happy families are alike; each unhappy family is unhappy in its own way."
  - Hence, let us examine these seven uncreative responses, starting with those with a high initial probability and then turning to those with a low initial probability



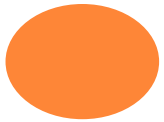
The Seven Uncreative Responses: Four with *High* Initial Probability

- 1. Habitual ("reproductive" or "routine") responses: $p \rightarrow 1$, $u \rightarrow 1$, and $v \rightarrow 1$
  - In words, the response has a high probability because it has a high utility and that high utility is already known in advance (for rational creatures, as $uv \rightarrow 1$, $p \rightarrow 1$)
  - If $p = u = v = 1$, we can even speak of *automaticity*
  - Such responses represent the established *expertise* that maintains adaptive behavior at both home and work



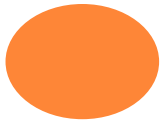
The Seven Uncreative Responses: Four with *High* Initial Probability

- 2. Fortuitous responses: $p \rightarrow 1$, $u \rightarrow 1$, but $v \rightarrow 0$
  - In words, the response has a high probability and a high utility, but that the prior knowledge of that utility is near nil, rendering it a “lucky guess”
  - E.g., the traveler coming to a fork in the road



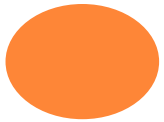
The Seven Uncreative Responses: Four with *High* Initial Probability

- 3. Irrational perseveration: $p \rightarrow 1$, $u \rightarrow 0$, but $v \rightarrow 1$
  - A “habitual” response remains so despite knowing full well that it is maladaptive
  - “The definition of insanity is doing the same thing over and over and expecting it to come out different.”
  - E.g., continuing to live with an abusive partner whose promises to reform repeatedly fail



The Seven Uncreative Responses: Four with *High* Initial Probability

- 4. Problem finding: $p \rightarrow 1$ but $u \rightarrow 0$ and $v \rightarrow 0$
  - A response that has a high probability but low utility is emitted because that low utility is unknown in advance
  - The person has unexpectedly learned the limits of their expertise
  - And because $(1 - v) \rightarrow 1$, the result is highly surprising!
  - Problem finding constitutes a major stimulus for creativity (e.g., anomalies in paradigmatic sciences)

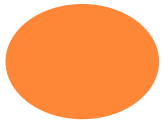


The Seven Uncreative Responses: Three with *Low* Initial Probability

- 1. Rational suppression: $p \rightarrow 0$ because $u \rightarrow 0$ and $v \rightarrow 1$
  - E.g., the extinction of a maladaptive response through punishment or non-reinforcement
  - As *pre-selection*, plays a key role in BVSR creativity (Simonton, 2011)
    - The creator need not generate and test what is already known to be useless!
      - E.g., a theoretical physicists pre-selects out of consideration any idea that would violate a fundamental law of nature, such as the three laws of thermodynamics
    - Hence, in this sense BVSR can be "sighted" even while testing "blind" variations (cf. Sternberg, 1998)

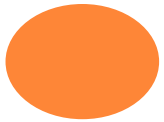
The Seven Uncreative Responses: Three with *Low* Initial Probability

- 2. Irrational suppression: $p \rightarrow 0$ even though $u \rightarrow 1$ and $v \rightarrow 1$
  - Even though a person knows what's the best thing to do, he or she does not do it
  - E.g., adaptive behaviors suppressed by a phobia or other excessive anxiety
  - N.B.: This uncreative response pinpoints a problem with the standard definition
    - If the third criterion is omitted, the *standard* definition becomes $c = (1 - p)u$
    - Yet how is it even possible for $p \rightarrow 0$ if $u \rightarrow 1$?
    - The obvious answer is that $v \rightarrow 0$
    - If otherwise, then we must get irrational suppression rather than creativity
    - Ergo, the standard definition is untenable, period



The Seven Uncreative Responses: Three with *Low* Initial Probability

- 3. Mind wandering or behavioral exploration: $p \rightarrow 0$, $u \rightarrow 0$, and $v \rightarrow 0$
  - Two major examples
    - Mind wandering, such as fantasy and daydreaming (cf. the "default network")
    - Behavioral exploration, such as play, tinkering, and "fool's experiments" (Darwin, 1892)
      - But also systematic and heuristic searches (e.g., searching for the needle in the haystack, such as Edison's "drag hunts"; Simonton, 2015)
  - Indeed, only this type of response has any chance whatsoever of inadvertently generating a creative response
    - all others are defined by $p \rightarrow 1$ or $v \rightarrow 1$ or both
    - although creativity requires $u \rightarrow 1$, that possibility is not precluded because $v \rightarrow 0$
  - Hence, these parameter values define what takes place in the *incubation* period that comes between the *preparation* and *illumination* periods



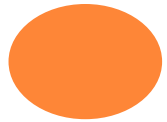
Illustrations: Maier's (1931) "Two-Strings" Problem

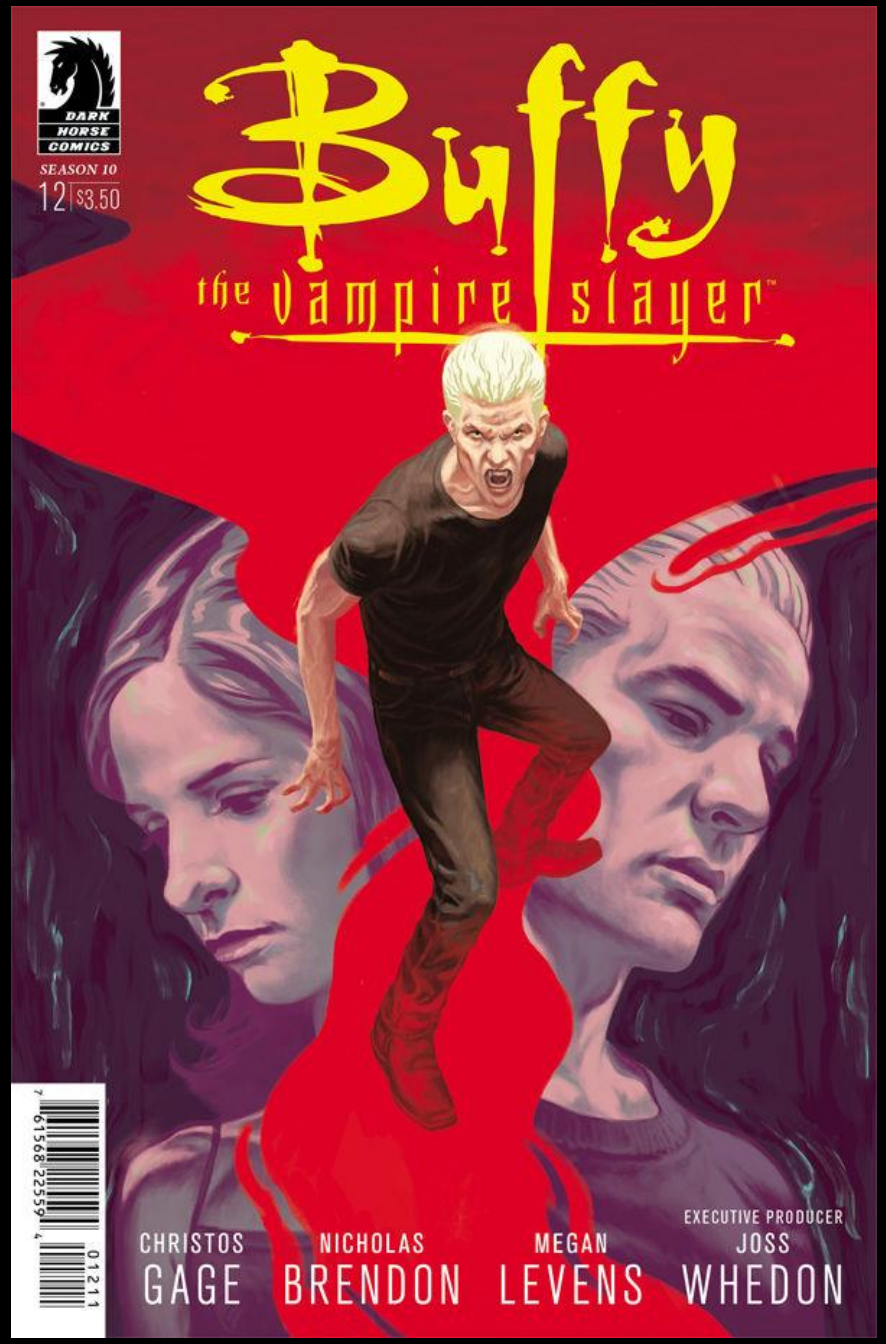
Illustrations: Maier's (1931) "Two-Strings" Problem

- Problem finding – yes!
- Rational suppression – possibly!
- Irrational perseveration – sort of …
- Habitual – yes, and more than one!
- Creative – yes!
- Fortuitous – not really …
- Irrational suppression – unknown
- Mind wandering or behavioral exploration – presumably yes!

Conclusions

- The standard definition of creativity (or any other two-criterion definition) is absolutely incapable of representing the diversity of uncreative responses
  - In particular, if the third “surprise” criterion (1 – *v*) is omitted, the number of uncreative responses must shrink from 7 to just 3, fewer than half as many
  - That reduction necessarily conflates (a) creativity with irrational suppression, (b) habitual with fortuitous responses, (c) problem finding with irrational perseveration, and (d) rational suppression with mind wandering or behavioral exploration – equivalences that make no logical or psychological sense
- Because creativity is tridimensional, it cannot possibly form one end of a bipolar dimension with uncreative anchoring the other end – a three-dimensional space is required to represent all response possibilities
- BVSR processes and procedures are then shown to be absolutely essential to creativity, with the corresponding participation of problem finding, rational suppression, and mind wandering or behavioral exploration




DARK HORSE COMICS
SEASON 10
12 $3.50
Buffy
the Vampire Slayer™
CHRISTOS GAGE
NICHOLAS BRENDON
MEGAN LEVENS
EXECUTIVE PRODUCER
JOSS WHEDON