

Dimensions of Creative Evaluation: Distinct Design and Reasoning Strategies for **Aesthetic,** **Functional** and **Originality** Judgments

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Starting point: the definition of creativity

Mayer (1999, p. 451)

“In summary, there is some consensus in the creativity research community concerning what to study: Creativity occurs when someone creates an original and useful product.”

Conceptually vague:
implications for the
design process?



Framing

- We argue that the dimensions of creative evaluation have underpinning logics linked to assumptions of creativity. These logics in turn have consequences for reasoning and suggestion making during the creative process.

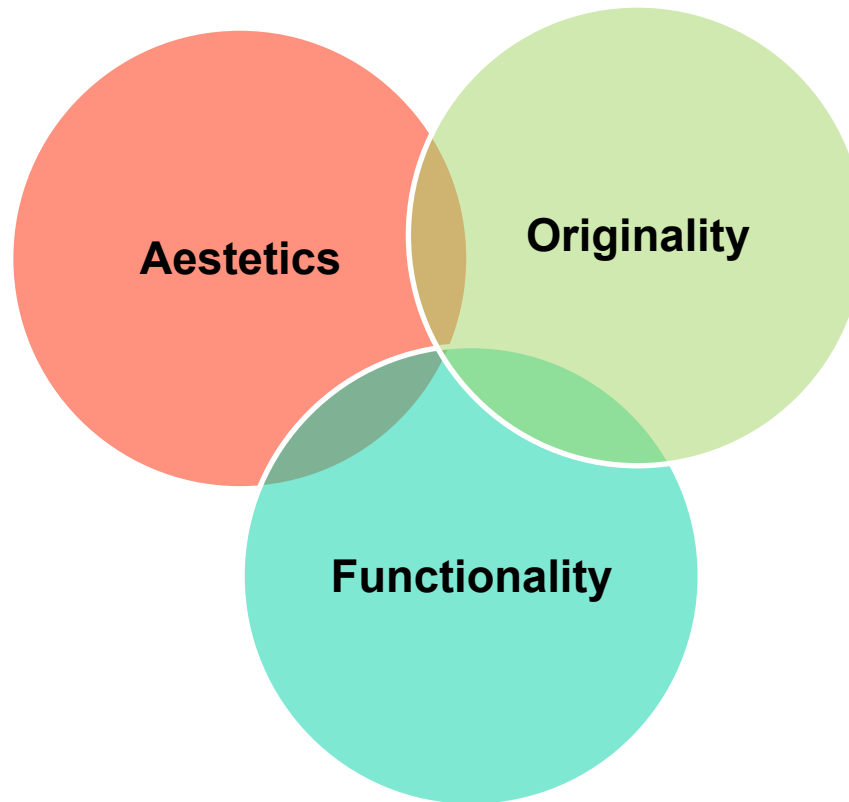
Focus

- Industrial Design data sets
- We focus on the evaluations and reasoning of the *experienced* designers
- Evaluation in this paper related specifically to the evaluation of *pre-inventive structures* (ideas, sketches, prototypes, objects), but not to the evaluation of persons (i.e., students) or processes.



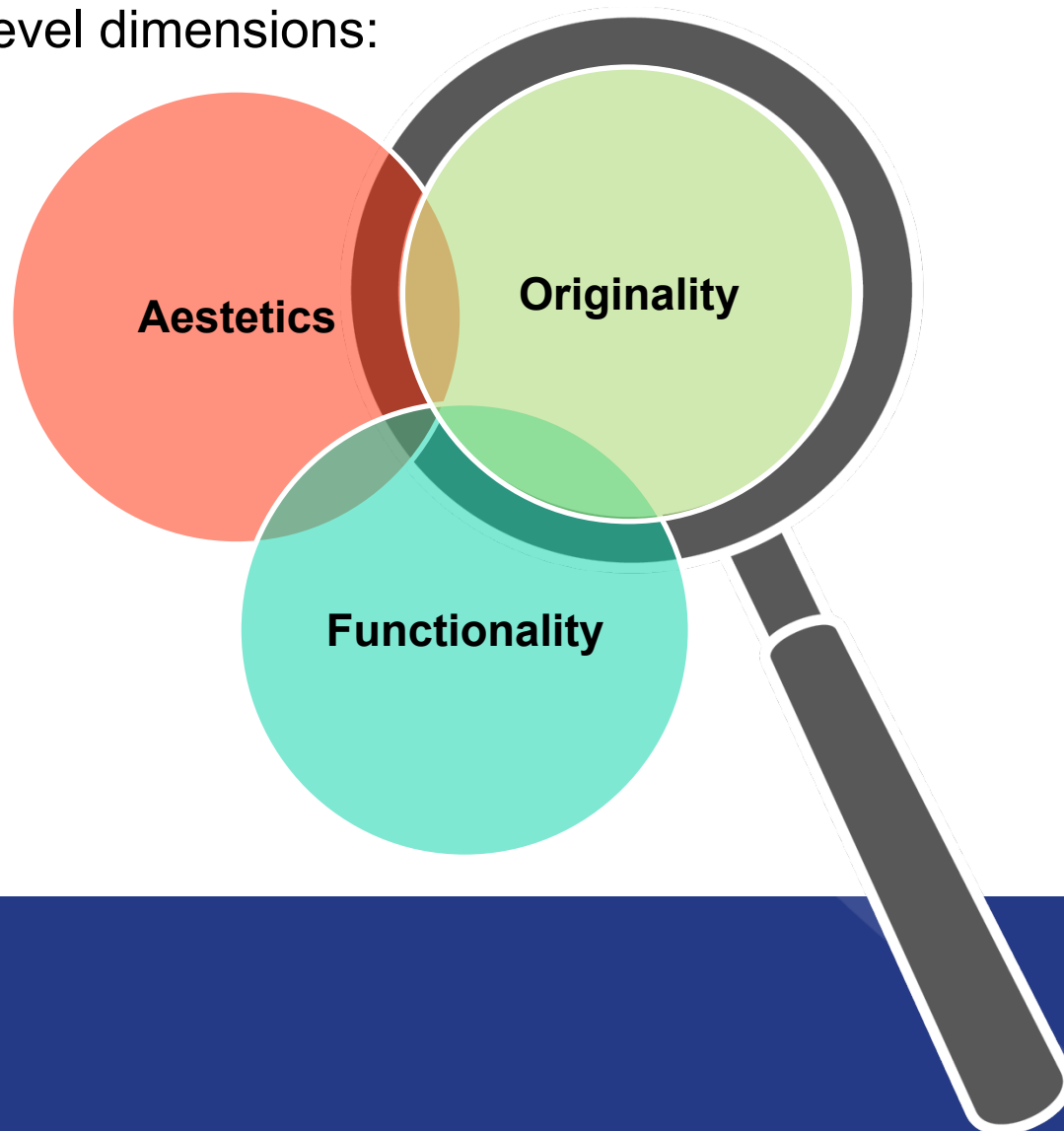
Minimal assumption of dimensions of creative evaluation in Industrial Design.

At least 3 high level dimensions:



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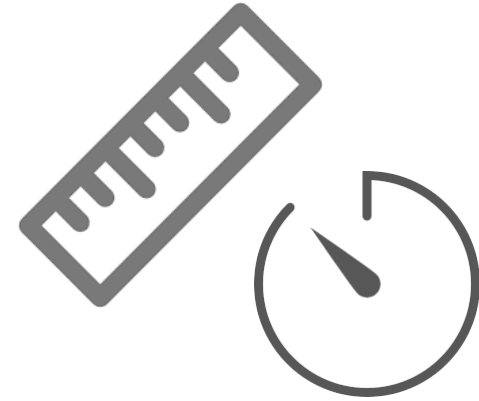


The logics of creative dimensions

(1) what is the basis of evaluation?



Subjective assessment



Objective measurement

Aesthetics

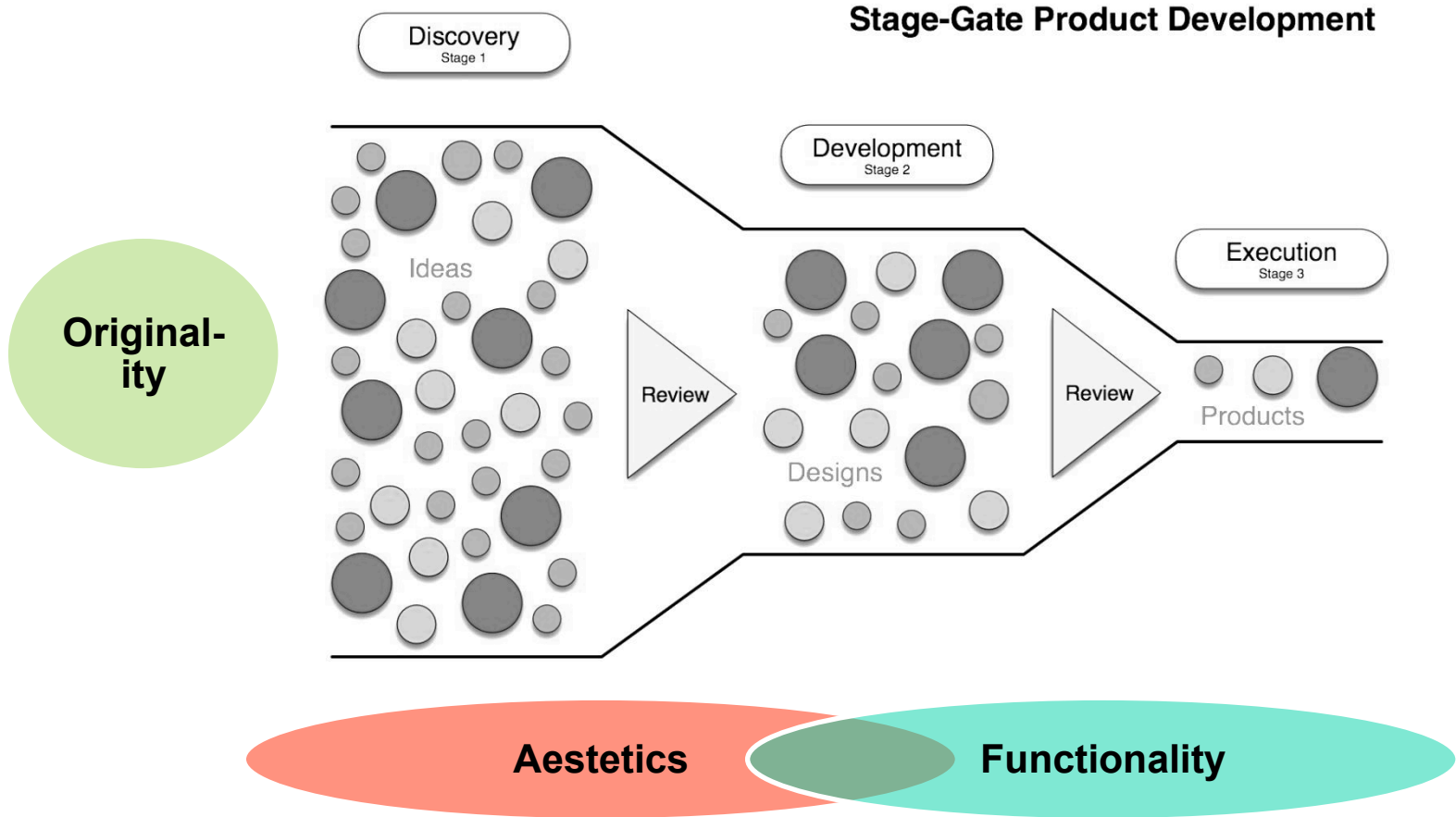
Functionality

Originality



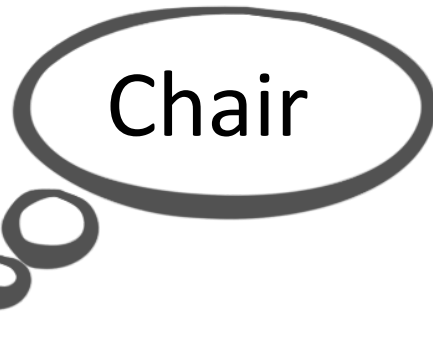
The logics of creative dimensions

(2) what constitutes an idea? (unit vs process)



The logics of creative dimensions

(3) how important is object perception and interaction?



Aesthetics

Functionality

Originality



Hypotheses

- Comparing **aesthetic** evaluation to **functionality** evaluation we predict in the former more suggestions for development through trial and error (H1a), less mental simulation (H1b) and fewer suggestions for testing the concept (H1c).
- Comparing **originality** evaluation to **aesthetic** evaluation we predict in the former less mental simulation (H2a), more 'go/kill' decisions for whole concepts (H2b) and fewer suggestions for development through trial and error (H2c).
- Comparing **functionality** evaluation to **originality** evaluation we predict in the former more suggestions for changing elements or forms (H3a), more mental simulation (H3b), fewer 'go/kill' decisions (H3c) and more concept testing suggestions (H3d).



Methods

Employed 'In Vivo' research methodology (e.g., Dunbar, 1995; Ball & Christensen, 2009; Christensen & Ball, in press).

Industrial Design data sets (both Graduate and Undergraduate)
- 13 Student/supervisor pairings; 39 transcripts

Segmentation according to turn-taking during spoken dialogue
(4316 segments)

Three independent coders, by applying 6 codes in 5 iterations



Coding evaluative statements & episodes

Evaluative statements: any statement that comments on or evaluates (either positively or negatively) the designed product or design idea.

Evaluation episodes: a block of segments relating to this evaluation, which contains descriptions and/or explanations of the design idea as well as segments involving further development or reasoning concerning the evaluation. Evaluation episodes are then divided into aesthetic, originality, and functionality episodes.

Aesthetics

This was – save this for another – this one's kinda neat. I really loved how this curved around. (*Undergraduate; Alice; 2nd review; line 121*)

Functionality

Ya' know, I love the idea of having accessories that, that can hang from the branches that allow you to customize it and, ya' know, it supports different functionality. (*Graduate; Mylie; Client review; line 92*)

Originality

This one seems a little far-fetched. I mean, like I – like I said, I appreciate the, uh, I appreciate the out, ya' know, the thinking outside the box, but it's, I mean, maybe we're too – in too much reality. (*Graduate; Eva; Client review; line 77*)



Coding of Design Idea Progression Suggestion

Evaluation episodes are coded in 5 subcategories every time an experienced designer makes a Design Idea Progression Suggestion

Go/kill	I think you have other stronger concepts. <i>(Graduate; Julian; Client review; line 29)</i>
Change form or element	And, ya' know, maybe you add the fragrance thing in and kinda' take it from there. <i>(Graduate; Mylie; Client review; line 60)</i>
Test concept	Talking about get a dowel and drill through the – drill through the bottom all the way up, and, and then, ah, with a drill press and then, ah, gotta dowel and see if it actually functions. <i>(Undergraduate; Tommy; Look like; line 65)</i>
Search for information	Okay. So you gotta do a little research. <i>(Graduate; Julian; Concept reduction; line 157)</i>
Trial and error	So play with your forms and dimensions, and then these others which are really, really exciting as independent pieces, that's really refreshing. Both these are really fun. Both of 'em have great merit. [Clears throat]. <i>(Undergraduate; Alice; 2nd review; line 177)</i>



Coding for mental simulation

The running of a mentally constructed model, containing a sequence from an initial representation; the running of some mental modification, resulting in a changed representation (Trickett & Trafton, 2007; Ball & Christensen, 2009; Christensen & Schunn, 2009)

Yeah, and **then** you've got this sort of element. Now one of things when it goes on the floor, um, you may consider maybe that's a have some semi-soft machinable plastic pieces of material. Um, or **maybe it could be**, um, a – maybe a metal piece or something. I don't know. But, anyway, we need to have some kind of structure. You won't, you won't have narrow enough fabric to the floor – even **if** slightly, maybe like wood. Um, so **then** this, this could be uh wood piece that could be, could be fabric in here maybe it comes down, or something just, keep just, just keeps the [clears throat] fabric from touching the floor and it's already kind of moisture or whatever (*Undergraduate; Adam; 2nd review; line 35-37*)



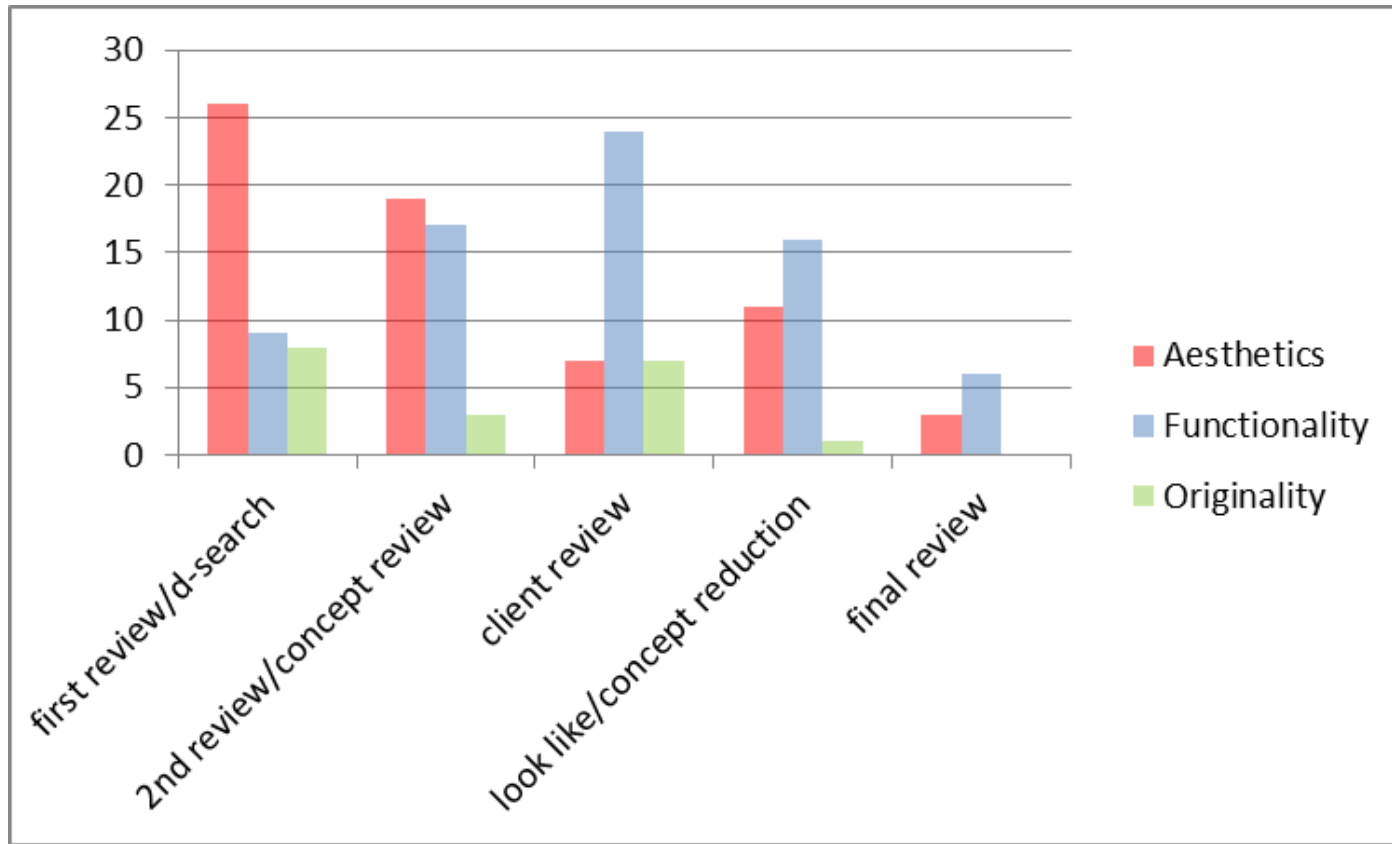
Reliability

Kappa coefficients for inter-coder reliability

Code	Kappa coefficient
Mental Simulation	.71
Evaluation Episodes	.75
Design Idea Progression Suggestion	.68
Evaluation Valence	.86
Evaluation Type	.85
Uncertainty	.90



Results



Frequencies of dimensions by timeline



Results. Logistic regression predicting evaluation type (aesthetic vs. functional) from DIPS and mental simulation



Aesthetics



Functionality

	B	SE	Wald	df	Sig	Exp(B)
H1C DIPS–Test concept	3.16	1.20	6.93	1	.01	23.55
H1A DIPS–Trial and error	-1.47	0.67	4.82	1	.03	0.23
Constant	0.11	0.19	0.35	1	.56	1.12

H1B: (Mental sim), not supported



Results. Logistic regression predicting evaluation type (aesthetic vs. originality) from DIPS and mental simulation



		B	SE	Wald	df	Sig	Exp(B)
H2B	DIPS–Go/kill	1.19	0.56	4.59	1	.03	3.28
H2A	Mental simulation	-1.31	0.69	3.60	1	.06	0.27
	Constant	-1.37	0.42	10.83	1	.00	0.25

H2C: (Trial and Error), not supported



Results. Logistic regression predicting evaluation type (functionality vs. originality) from DIPS and mental simulation

Functionality

Originality

		B	SE	Wald	df	Sig	Exp(B)
H3C	DIPS–Go/kill	1.68	0.60	7.96	1	.01	5.39
	DIPS–Search for information	2.72	1.28	4.52	1	.03	15.18
H3A	DIPS–Change form or element	-2.17	0.82	7.05	1	.01	0.11
	Constant	-1.51	0.43	12.40	1	.00	0.22

H3B: (Mental simulation), supported after collinearity checks

H3D: (Testing concepts), not supported



Conclusion

We argued that dimensions of creative evaluations differ on the basis of their underpinning logics related to assumptions of creativity (what is an idea; what is the basis of evaluation; how important is perception & interaction).

Our results show some initial support for the claim that these logics lead to predictable differences in design idea progression suggestions, and mental simulation patterns made by experienced designers at design critique sessions in Industrial Design.



Theoretical contribution

We argue that the results hold promise for informing theories of creative evaluation, which at the moment mainly contain theories of consensual assessment (e.g., Amabile; Csikszentmihalyi) or universal claims of which dimensions are involved in creativity (e.g., O'Quinn & Besemer).

Contrary to these theories, our results and arguments indicate that

- 1) Creative evaluation is domain specific
- 2) Creative evaluation involves several distinct dimensions (varying by domain)
- 3) The underpinning logics regarding creativity of these dimensions may be in opposition
- 4) The underpinning logics of these dimensions lead to predictable differences in design reasoning and progression suggestions during the design process.



Future perspectives

A direct hypothesis derived from the present argumentation is that domains (including design domains) should differ in somewhat predictable ways in their distribution of creative dimension episodes.

This hypothesis is testable even within the DTRS10 datasets, by e.g., repeating the analysis for the Choreography data.



Thank you!

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Practical implications

The idea that different dimensions of creative evaluation lead to certain types of progression suggestions may alert design evaluators to the nature and consequences of their critical appraisals.

For example, it may be important to strike the right balance between critiques of the different dimensions when giving feedback.

