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Ratings in, rankings out. Keep it simple, they said. But we need more than that.

Christine Bauer

4th Workshop on Recommendation in Complex Environments (ComplexRec 2020)

We need the 'right' information,
at the 'right' time,
in the 'right' place,
in the 'right' way,
to the 'right' person.

Gerhard Fischer (2012)—and many others

Gerhard Fischer (2012). Context-aware systems: the "right" information, at the "right" time, in the "right" place, in the "right" way, to the "right" person. In Proceedings of the International Working Conference on Advanced Visual Interfaces (AVI '12), pp 287–294. DOI: 10.1145/2254556.2254611

Ratings in, rankings out.
It's simple, isn't it?

Input

Explicit ratings

Implicit ratings

Output

1. ...
2. ...
3. ...

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Input

Explicit feedback

Implicit feedback

Have you ever searched for items...
...to find out what it actually is?
...to waste time until the next meeting starts?
...to find a present for your grandma?

Have you ever clicked
...to find out what
...to show your frie
...to waste time until the next meeting starts?
...that got annoying at some point?

Have you ever d
Have you ever b
...a present f
...the same k

Challenges:
Relation of explicit and implicit feedback

- Strength of a implicit feedback
- Stronger or weaker than explicit rating?

Research on good predictors from implicit to explicit expression

Challenges:
Which feedback instrument should we use?

- Domain-specific differences
  - Suitability: Fit of fine-granularity, burden to rate
  - Establishment does not necessarily mean good/best fit
- Individual differences
  - Preference how to express feedback
  - Preference/ability to express preference on a fine-granular scale
  - Individually perceived burden to rate
- Context: “What should we use? — It depends.”

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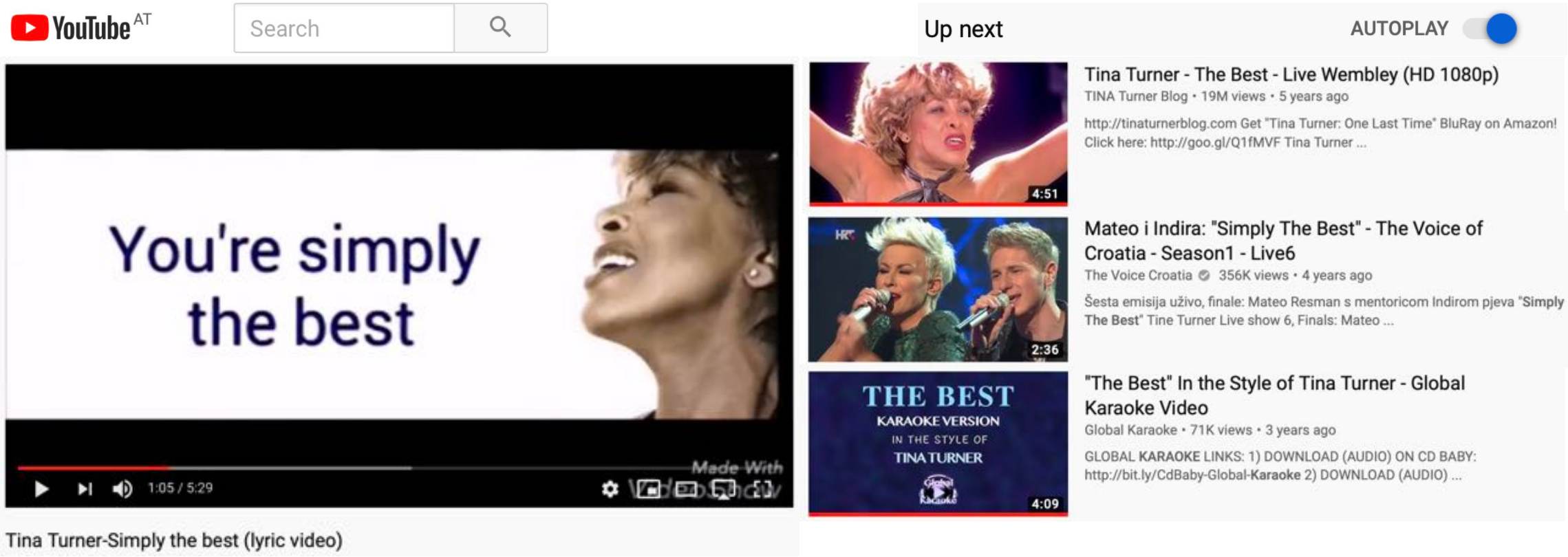
The relevance of context

Let's imagine...



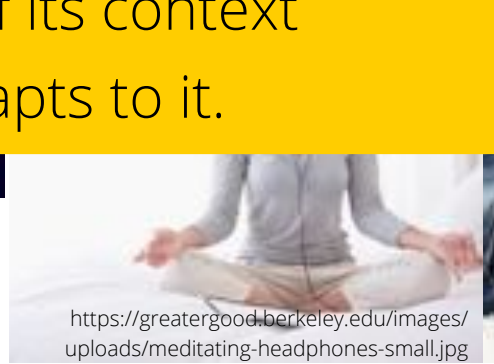
One size does not fit all.

depends on the person

depends on the situation

https://news.usc.edu/files/2014/12/studying.jpeg-824x549.jpg

An ideal intelligent system
is aware of its context
and adapts to it.



https://greatergood.berkeley.edu/images/uploads/meditating-headphones-small.jpg

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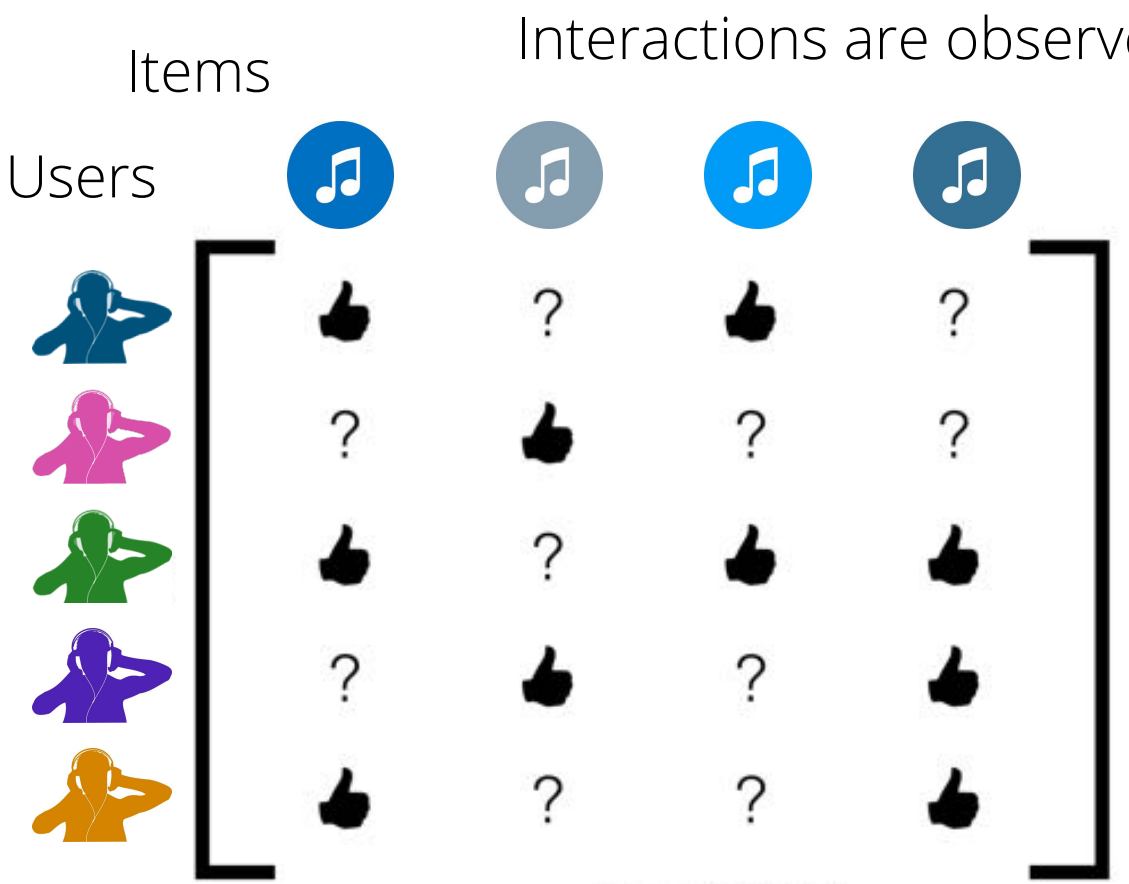
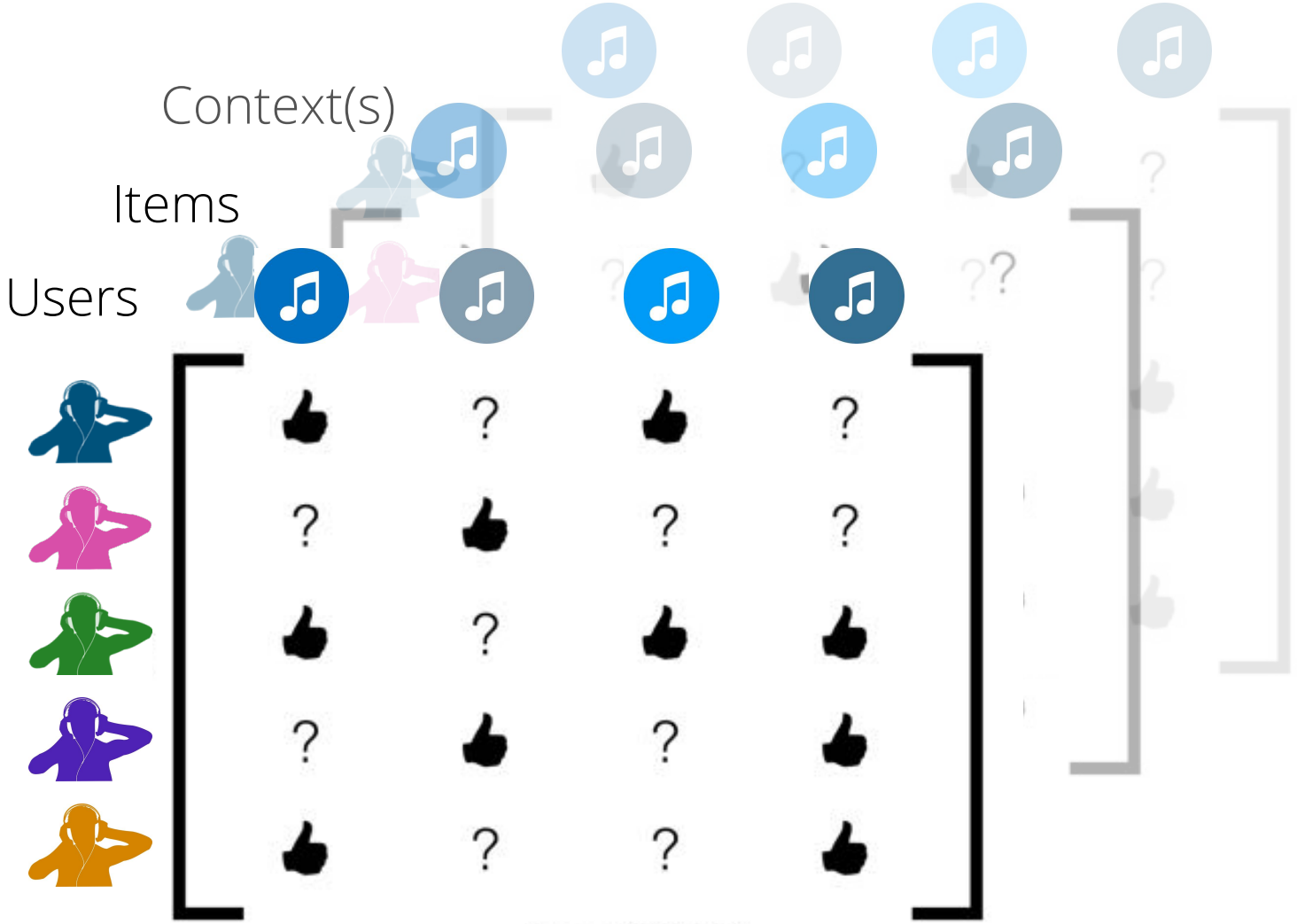
Recommendation as a matrix completion problem

user x item → rating



Recommendation as a matrix completion problem

user x item x context → rating



Context is any information that can be used to characterize the situation of an entity.

Anind K. Dey (2001)

Anind K. Dey (2001). Understanding and using context. Personal and Ubiquitous Computing, 5(1), pp 4-7.

The typical approach to context in recommender systems research

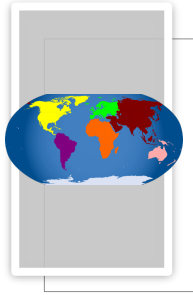
user x item x context → rating

Everything that is
neither the user (id)
nor the item (id) is context.

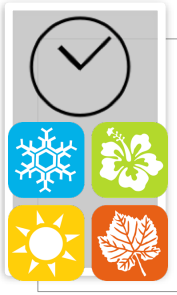
But what **is** context?
What context is **relevant**?

e.g., potentially relevant context elements for music recommendation

personal preferences
- e.g., personality



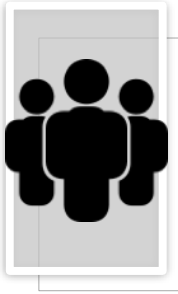
cultural background
- e.g., genres (e.g., K-Pop)



time
- e.g., Christmas songs

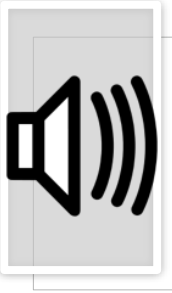
mood
- e.g., happy, sad

purpose
- e.g., relaxing, motivation for exercise



companion
- e.g., alone, with children

location
- e.g., in car, in Paris



speakers
- e.g., subwoofer, tiny speakers

to be continued...

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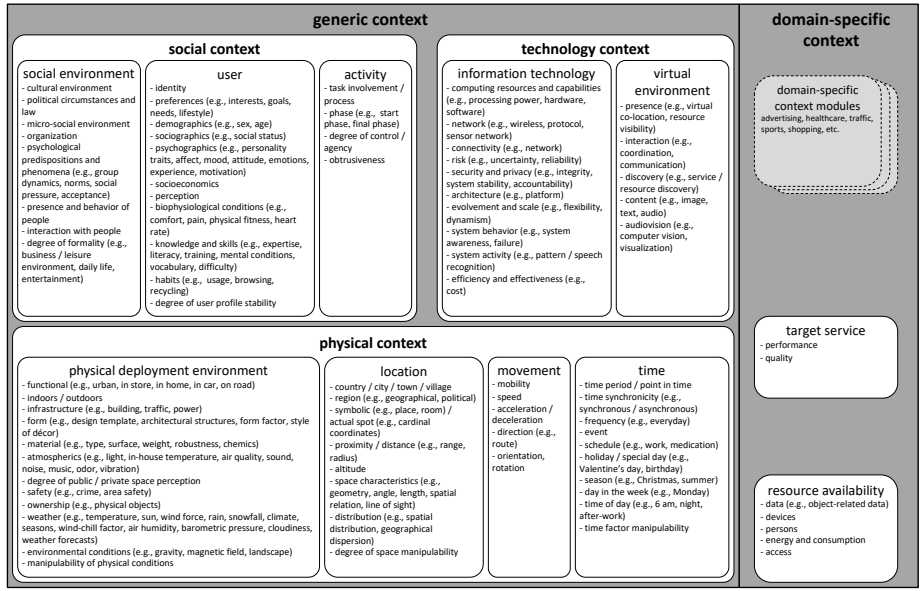
Context-aware computing

Context is a huge and heterogenous space!

- analysis of 36 context modes
- in 6 years of research
  on context-aware computing:
- total of **10,498 context elements**
  (**3,741** unique context elements)



Christine Bauer & Alexander Novotny (2017). A consolidated view of context for intelligent systems. Journal of Ambient Intelligence and Smart Environments, 9(4), pp 377-393. DOI: 10.3233/ais-170445

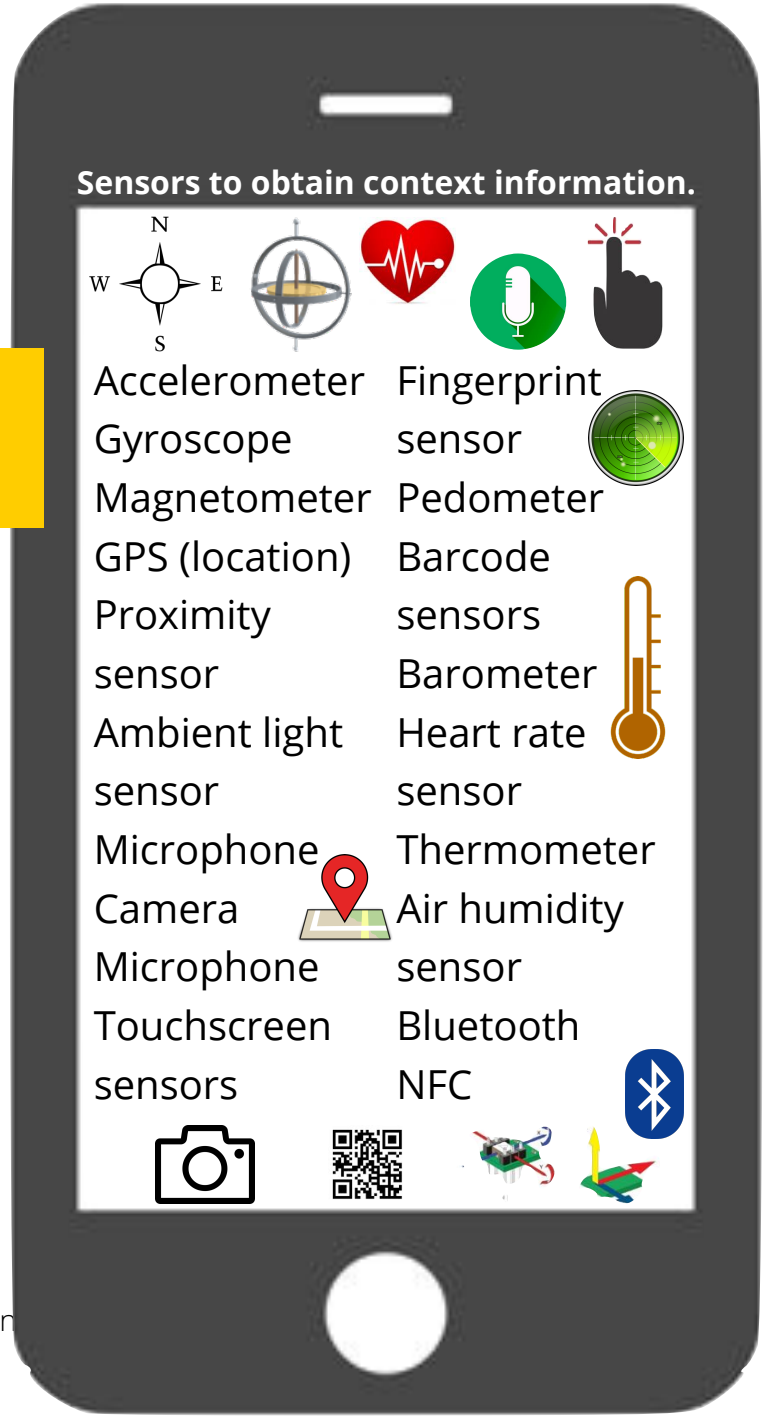
What we use in recommender systems is very limited.

examples from music recommender research

user preferences	social aspects of users
popularity of music item	physical environmental situation description
user demographics	situation description of the user
...	...

Let’s meet the complexity of input!

We could open up new space if we considered
the various facets of context for recommendations.



Context-awareness may help to:

- increase user satisfaction
- identify problems (evaluation)
- mitigate those problems (system design)

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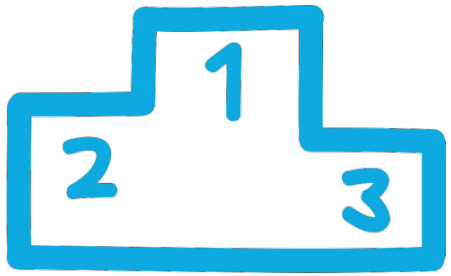
Output

Rankings

1. …
2. …
3. …



4. …
5. …

What is the implication of such a cut-of?

What would you choose in this ranking presentation?

Bundles, complementary goods, sequences

- Compatibility

- Completeness

Chapter 1 | Chapter 2 | Chapter 3 | ~~Chapter 4~~

- Sequences

Chapter 1 | Chapter 5 | Chapter 4 | Chapter 2

Ranking of bundles

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Pervasive advertising

Contextual advertising
Editorial advertising
…

It is not all about the person—the situation matters.

depends on the person

depends on the situation

https://uproxx.files.wordpress.com/2018/04/runner1-grid-uproxx.jpg?quality=95

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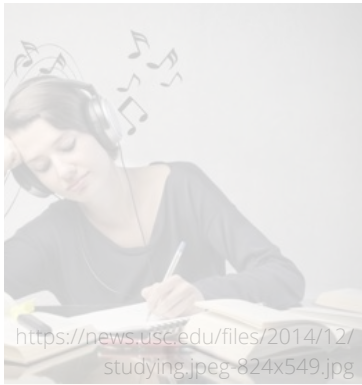
https://cdn-images-1.medium.com/max/1000/0*ne9Fr33kmEJJ2pGw.jpg

Personalization and situationalization

depends ation

		Situationalization	
		no	**yes**
Personalization	**no**	(I) no adaptation	(IV) adaptation to a specific situation
	1:1	(II) adaptation to a specific individual	(V) adaptation to a specific individual and to a specific situation
	1:n	(III) adaptation to a group of individuals	(VI) adaptation to a group of individuals and to a specific situation



Christine Bauer & Peter Lasinger (2014). Adaptation strategies to increase advertisement effectiveness in digital media. Management Review Quarterly, 64(2), pp 101-124. DOI: 10.1007/s11301-014-0101-0

Peter Lasinger & **Christine Bauer** (2013). Situationalization: the new road to adaptive digital-out-of-home advertising. Proceedings of the IADIS International Conference e-Society (ES 2013). Lisbon, Portugal, 13-16 March, pp 162-169.

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