

Autism and the predictive mind Context blindness 2.0

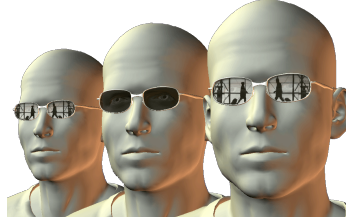
PETER VERMEULEN, PhD



AUTISM in CONTEXT
from neurodiversity to neuroharmony

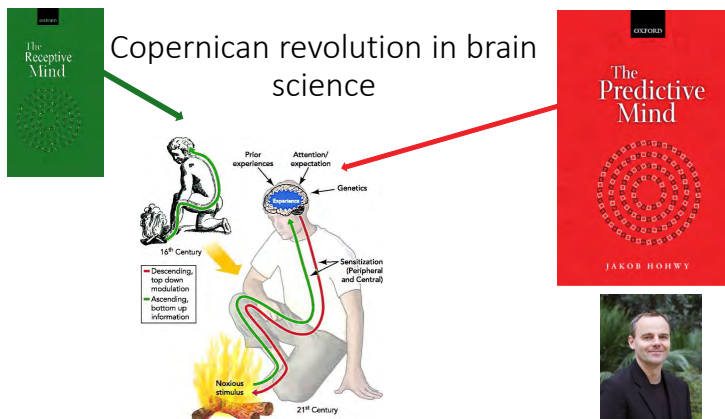
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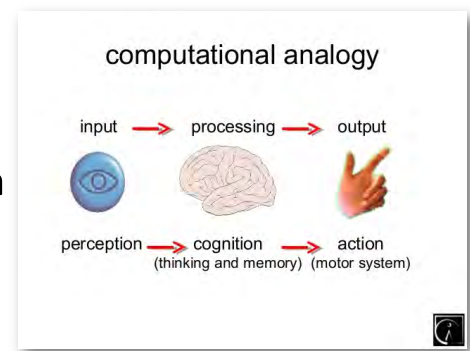


Autism friendliness

- An autism friendly approach starts from an understanding of autism from within!
- Knowledge of “autistic thinking” is the key to success in education and treatment!



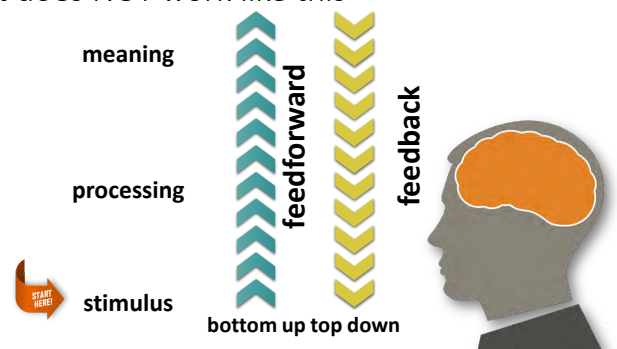
Default idea about the brain



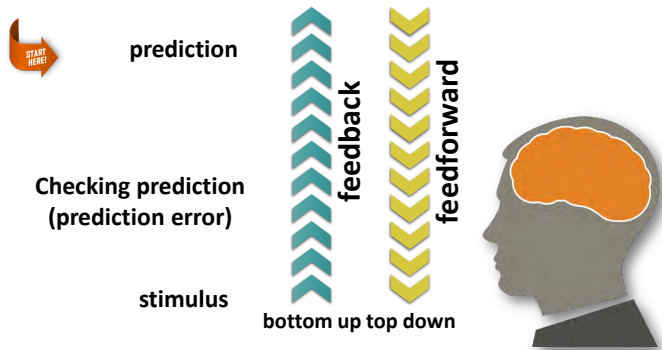
What's wrong with our current ideas about the brain?

- Information processing is not linear
- Sense making is not just integrating all the details of the sensory input
 - There isn't enough time to calculate and make that puzzle! (Daniel Kahneman)
 - Processing all the sensory input (computing) is not very helpful for survival! (Smilodon story)
- So, the brain does not compute, It guesses,
- And it can make smart guesses because it uses context,
- This is known as: **the predictive mind**

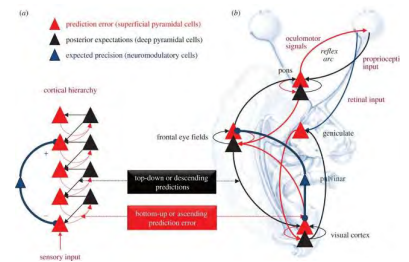
So, it does NOT work like this



But it works like this

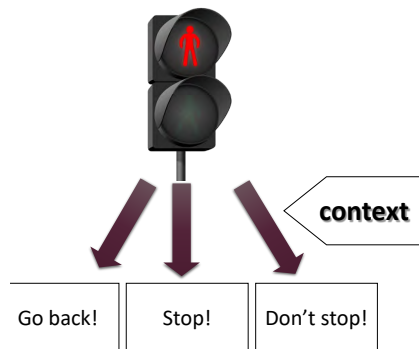


The brain does not process stimuli, only what is different from the stimuli it predicted...



From The Lancet

iving in a relative (VUCA) world



Nothing has an absolute meaning! Everything depends on context.

Therefore, our brain became an expert in using context for making quick and smart guesses.

Autism and the predictive mind: hypotheses

- Not enough, too broad predictions (hypo-priors) (Pellicano & Burr, 2012)
- Too specific predictions (Hohwy, 2015; Brock, 2012; Qian & Lipkin, 2011)
- HIPPEA: High, Inflexible Precision of Prediction Errors in Autism (Van de Cruys e.a., 2013, 2014)
- An imbalance of the precision ascribed to sensory evidence relative to prior beliefs. (Friston e.a., 2013; Lawson, Rees & Friston, 2014)

Autism and the predictive mind: context!

- In ASD, the dysfunction of prediction based on context may impair the ability to adapt quickly to an ever changing socio-emotional world. (Gomot & Wicker, 2012, p. 245)
- In particular, we think autism is associated with an inability to flexibly adjust the degree of precision in a different context. (Van de Cruys e.a., 2013, p.97-98)
- Autism may be related to problems with making predictions sensitive to the wider context." (Palmer e.a., 2015)
- Comparably, reduced global processing in autism may reflect a reduced role for top-down predictions in integrating sensory features into a more broadly coherent or context-sensitive percept." (Palmer e.a., 2017)

Autism as context blindness



Context blindness:

Reduced ability to use the context spontaneously when giving meaning to (especially vague, ambiguous and abstract) stimuli.

Autism as context blindness 2.0

Context blindness 2.0:

Reduced ability to use the context unconsciously and **spontaneously** to generate **predictions** about the world and process **prediction errors**.

Autism as a prediction disorder

This new idea could change our ideas about many things in autism such as:

- Sensory issues and what to do about them
- Communication
- Emotion recognition and how to teach socio-emotional skills

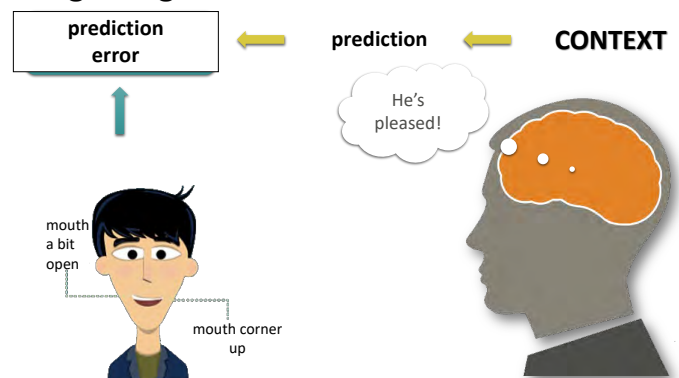
Context and emotion recognition

Relation facial expression –emotion is not fixed

We never see facial expressions out of context



Recognizing emotions



Again: context...

aps
ADVANCED PSYCHOLOGICAL SCIENCE

Context in Emotion Perception

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Abstract
We review recent work demonstrating consistent context effects during emotion perception. Visual scenes, voices, bodies, other faces, cultural orientation, and even words shape how emotion is perceived in a face, calling into question the still-common assumption that the emotional state of a person is written on and can be read from the face like words on a page. Incorporating context during emotion perception appears to be routine, efficient, and, to some degree, automatic. This evidence challenges the standard view of emotion perception represented in psychology texts, in the cognitive neuroscience literature, and in the popular media and points to a necessary change in the basic paradigm used in the scientific study of emotion perception.

Context more important than the face!

But people with autism rely on the face, not the context!

Short Report

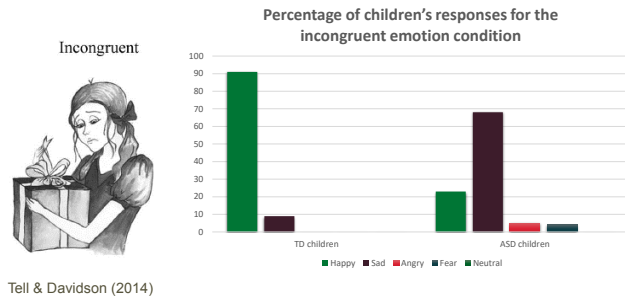
Emotion recognition from congruent and incongruent emotional expressions and situational cues in children with autism spectrum disorder

Dina Tell and Denise Davidson

autism
1-5
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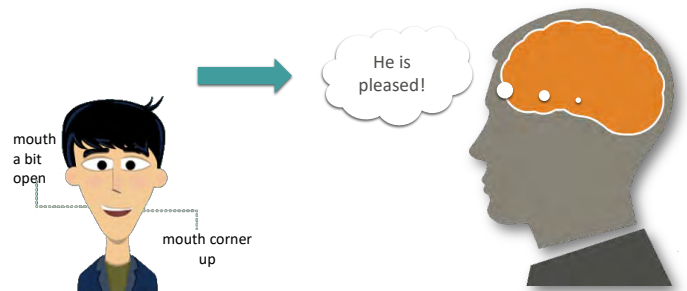
Context more important than the face!

But people with autism rely on the face, not the context!



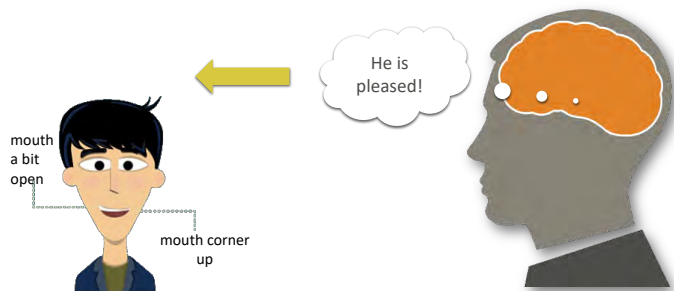
So, we thought emotion recognition went like this:

Reading emotions FROM faces



But it actually goes like this:

Reading emotions INTO faces

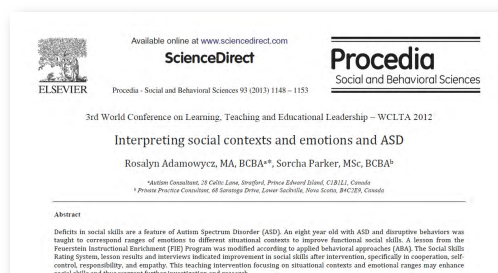


So we should teach people with autism to **PREDICT** emotions, using context, not faces



Link emotions to context

Start from contexts!



Predictive mind, context and social interaction

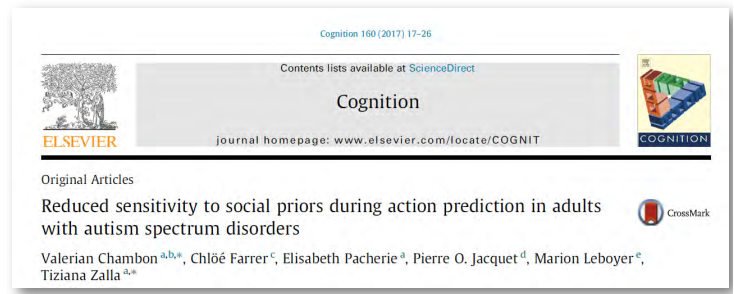
Action perception is not simply a reflection of what happens, but a projection of what will happen next.

(von der Lühe et al., 2016)

Predictive coding explains social deficit in ASD

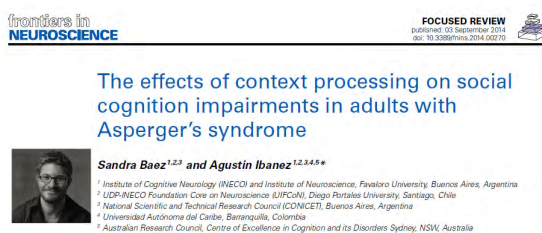


Despite intact Theory of Mind difficulties predicting what other people will do

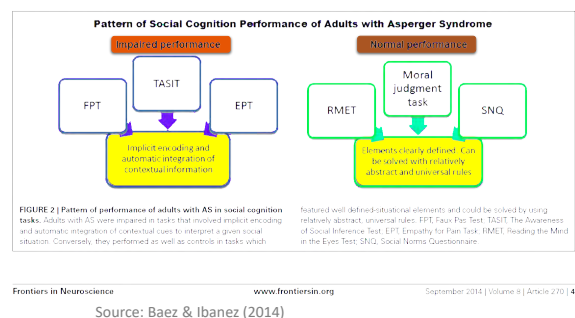


Context and social cognition

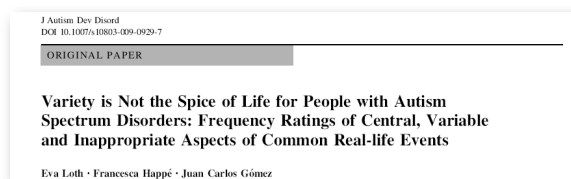
Social cognition in ASD only impaired when context is involved
(Baez, Ibanez et al., 2012; 2014)



Context and social cognition



Loth a.o. (2010)



- The biggest problem in ASD is not social skills (knowing **what** and **how** to do)
- The biggest problem in ASD is knowing **where** and **when** to do it and where and when **not**

Social competence requires contextual sensitivity

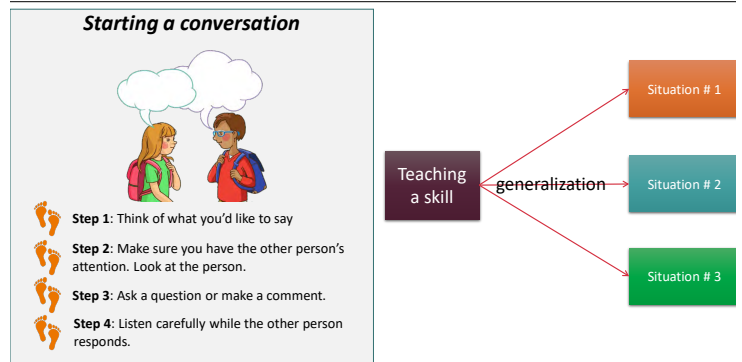
Contextual variations are often seen as central or as fixed rules, even in those who pass high level ToM tests
e.g. having a dessert when going to a restaurant

Contextualized teaching

- Do not use decontextualized materials
- Do not teach 'skills' but start from contexts
- Link behaviours always to contexts

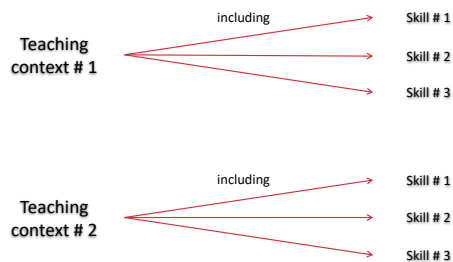
Starting a conversation

Teaching: traditional approach: generic skills



Contextualized teaching

Does not start from skills but from contexts



Contextualized teaching

Teaching and clarifying context:

- ✓ What can happen in that context?
- ✓ What can you do in that context?
- ✓ What can you say in that context?



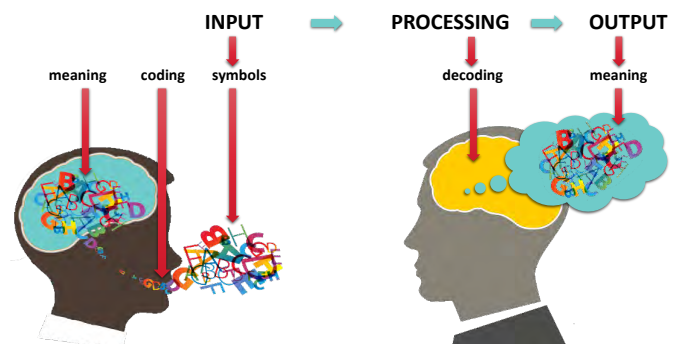
Contextualized scripts

Welcoming someone at your home:

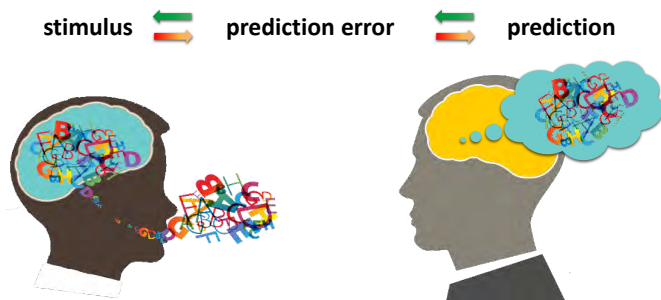
- When the person wears a coat, you ask "May I take your coat?".
- If the person says "no", invite him/her to come further in.
- If the person says "yes", wait until he/she gives you the coat and hang it on the coat rack. If you don't have a coat rack, hang the coat carefully over a chair.



Understanding language and communication: old model



Understanding language and communication: new model



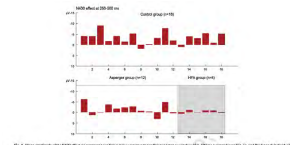
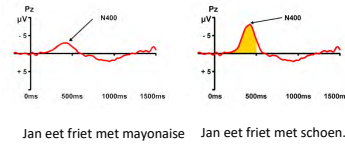
Context and predicting language and communication

The brain makes quick guesses about what someone is going to say or show, based on context

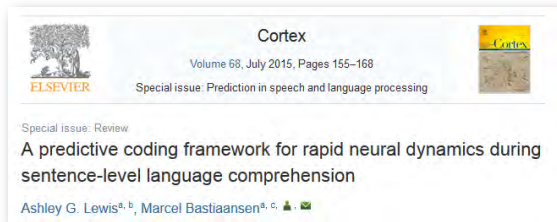
• N400

• **Lexical priming**

• N400 lower in people with autism (Pijnacker e.a., 2010)



Special issue Cortex, July 2015



Context and communication

Nothing has an absolute meaning, remember?

So, whatever we use to communicate...



...their meaning is never fixed, but depending on the context

Understanding language = predicting language!

Context and communication

What is difficult for people with ASD, is to find out what something (a word, a sentence, a gesture, a picture etc.) means **in this context**

Context helps predicting communication



If your brain is *context blind*, it will have difficulties predicting (and hence understanding) communication

Pushing the context button in communication

I will now ask
you something
about
yesterday

And now
something
about the actors
in the movie

OK, Let's
now move
on to
question #2.

Pushing the
context button
helps to 'predict'
an uncertain
world with all its
ever changing
meanings



Contextualizing the concept of free time

- How much free time do I have?
☐ < 15 min. ☐ 15-30 min. ☐ 30-60 min. ☐ > 1 hr
- Do I want to do something together with someone?
☐ No ☐ Yes
- Where can I do an activity?
☐ Inside ☐ Outside

Choosing a free time activity



Hopefully you could put
all the information
in context...



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