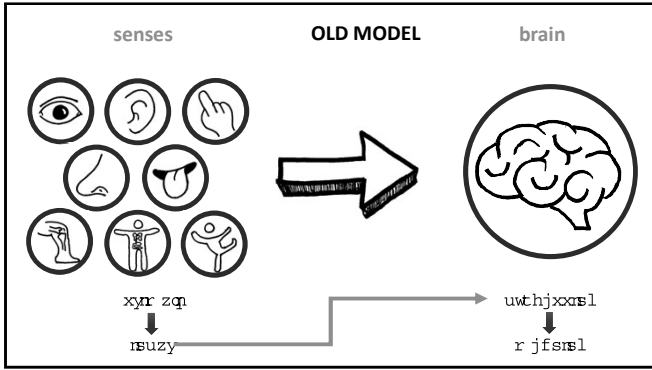
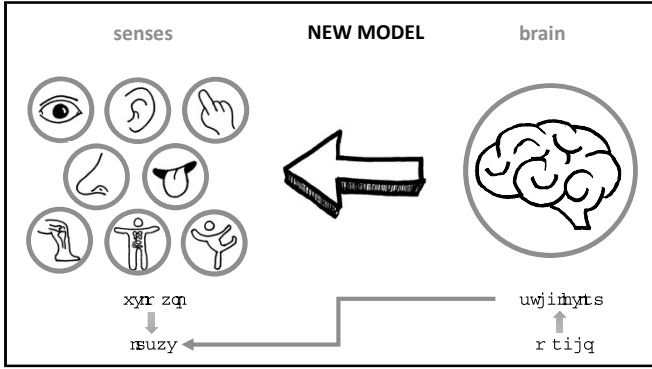


What's wrong with the stimulus-response model of the brain

- 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)
- 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**





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

From *The Lancet*

If the brain does not like prediction errors,
why don't we sit in a dark hole with no input at all?

Brain fitness requires...challenges

Flow

Mihaly Csikszentmihalyi

Prediction errors

- The brain has only one goal:
helping us to survive by minimizing prediction errors, either by learning or by changing the world
- The brain doesn't like prediction errors (they cause stress)
- The brain knows it cannot avoid all prediction errors. Therefore, it uses **a variable precision** in handling prediction errors

Depending on the **context** the brain will treat a prediction error as noise (irrelevant) or signal (relevant)

- If relevant, this leads to learning or action

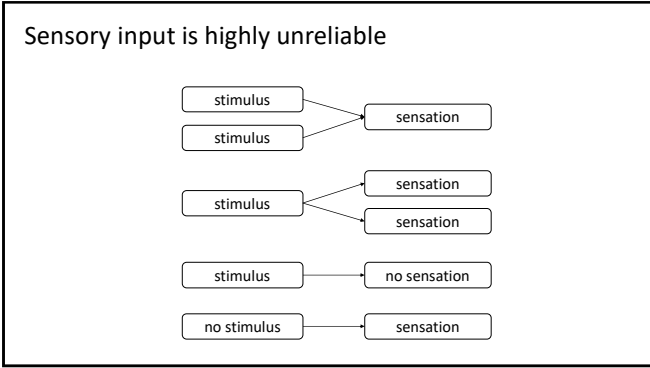
Prediction errors

If a prediction error is seen as signal, then the brain has 2 options to minimize the prediction error:

1. Updating the model to match reality (= learning)
2. Updating the world to match the model (= intervening/action)


Predictive mind

Predicts the sensory input. If there is a prediction error, the brain has to decide whether it ignores it or do something with it: learning (updating the model/prediction) or action (updating/changing the world).



Perception is controlled hallucinating.
 We don't see the world, but our model of the world.

Our perception of the world is an **illusion** that (in most cases, fortunately) coincides with reality.



Chris Frith

Sensory input is not the most important

In terms of neural connections, only 10% of the information our visual brain uses comes from the eyes.

The rest comes from other parts of the brain: **90%.**

Information is meaningless (Beau Lotto)

Psychological Review
 2014, Vol. 201, No. 4, 460–473

© 2014 American Psychological Association
 0033-2909/14/\$12.00 http://dx.doi.org/10.1037/xap0000083

Precise Minds in Uncertain Worlds: Predictive Coding in Autism

Sander Van de Cruys, Kris Evers, Ruth Van der Hallen, Lien Van Eylen, Bart Boets, Lee de-Wit, and Johan Wagemans
 KU Leuven

General Commentaries in
PSYCHOLOGY

GENERAL COMMENTARY
 published 28 January 2015
 doi: 10.1037/xap0000083

A predictive coding perspective on autism spectrum disorders

Jeroen J. A. van Boxtel^{1*} and Hongjing Lu^{1,2}

Journal of
Neurophysiology

Search


Advanced Search

HOME ARTICLES INFO FOR EDITORS SUBSCRIBE SUBMIT

Predictive coding in Autism Spectrum Disorder and Attention Deficit Hyperactivity


The weight given to sensory input or own expectations depends on the context

Known environment



■ Sensory input ■ Own model

Unknown environment



■ Sensory input ■ Own model

How much weight you give to a prediction error depends on how certain you are about your model of the world and the predictions based on that model (Lawson, Mathys & Rees, 2017)

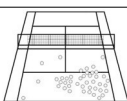
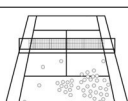

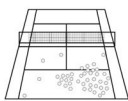
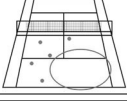
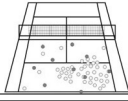
Autism, the predictive mind and context

- In autism the flexible adjustment in function of context of predictions and the weight given to prediction error seems to be affected
- HIPPEA:
High, Inflexible Precision of Prediction Errors in Autism
(Van de Cruys a.o., 2013, 2014)


10.1016/j.jurp.2014.04.001 © 2014 American Psychological Association
1073-0769/14/\$12.00 http://dx.doi.org/10.1037/xap0000001

Precise Minds in Uncertain Worlds: Predictive Coding in Autism


Sander Van de Cruys, Kris Evers, Ruth Van der Hallen, Lien Van Eylen,
 Bart Boets, Lee de-Wit, and Johan Wagemans
 KU Leuven

©Peter Vermeulen	Non autistic brain: Relative thinking	Autistic brain: Absolute thinking
Where the balls land		
Prediction		
Prediction errors		


Temple Grandin: My mind is a web browser



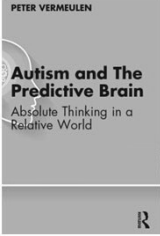
The balance of uncertainty:
High confidence in model: low precision



The balance of uncertainty:
Low confidence in own model: high precision



Main source of distress in autism



PETER VERMEULEN
Autism and The Predictive Brain
Absolute Thinking in a Relative World

Psychological Science
2015, Vol. 26, No. 1, 100–112

© 2015 American Psychological Association
1076-898X/15/\$12.00 DOI: 10.1037/xap0000048

Precise Minds in Uncertain Worlds: Predictive Coding in Autism
Sander Van de Cruys, Kris Evers, Ruth Van der Hallen, Lien Van Eylen,
Bart Boets, Lee de-Wit, and Johan Wagemans
KU Leuven


Absolute thinking in a highly unpredictable world

↓

confusion – uncertainty - anxiety

Basic problem in autism:
absolute thinking in a relative world

Nothing has an absolute meaning



The biggest problem in autism is...

UNCERTAINTY

Review

The relationship between intolerance of uncertainty and anxiety in autism: A systematic literature review and meta-analysis

Richard Jenkinson¹, Elizabeth Milne¹ and Andrew Thompson²



Autism
2020, Vol. 24(8) 1933–1944
© The Author(s) 2020

Article reuse guidelines:
sagepub.com/journalsPermissions
DOI: 10.1177/1362644220970437
journals.sagepub.com/home/aut



Developmental Review
2014, Vol. 33, No. 4, 649–679

© 2014 American Psychological Association
0893-3200/14/\$12.00 http://dx.doi.org/10.1037/dev0000060

Precise Minds in Uncertain Worlds: Predictive Coding in Autism

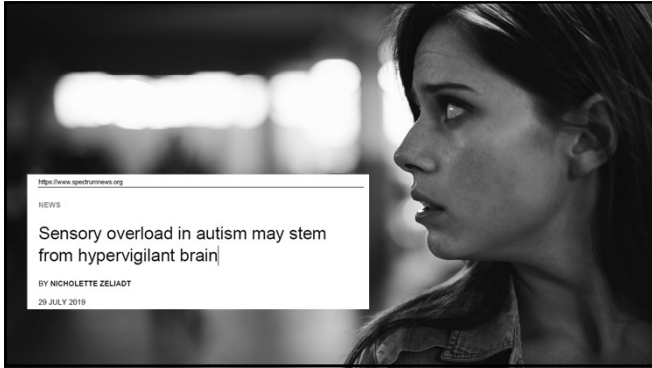
Sander Van de Cruys, Kris Evers, Ruth Van der Hallen, Lien Van Eylen, Bart Boets, Lee de Wit, and Johan Wagemans
KU Leuven

PREDICTIVE CODING IN AUTISM 661

(e.g., under the form of enhanced discomfort to bright light; Kern et al., 2001). When the gain of the neural units representing the prediction errors is fixed at a high level, it is easy to see that hypersensitivity becomes very likely, especially for unexpected input, as is the case in ASD. Overweighting of irrelevant prediction errors causes sensory overload.

Seeing that unpredictability is at the core of the sensory overload, we can also attempt to explain its negative affective impact. Uncertainty has long been identified as a factor that intensifies stress and anxiety (Herry et al., 2007; Miller, 1981). In addition to leading to increased stress and anxiety, persistent significant prediction errors may actually by themselves generate negative affect (Huron, 2006; Van de Cruys & Wagemans, 2011). When prediction theories (Chevallier et al., 2012) that this is an important aggravating factor in the syndrome. Indeed, social interactions are not perceived to be that enjoyable or rewarding in individuals with ASD (Chevallier et al., 2012). Unsurprisingly, a lot of interventions focus on increasing the reward of social interactions. If social situations are avoided from early on in life, the number of social learning experiences decreases, and so, in a vicious circle, even more social impairments ensue.

Taken together, these factors arguably make individuals with ASD more vulnerable to mood and anxiety problems, which are indeed overrepresented in ASD (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000). Hence, mood problems, anxiety, and anxious avoidance should in our view be considered as secondary symp-



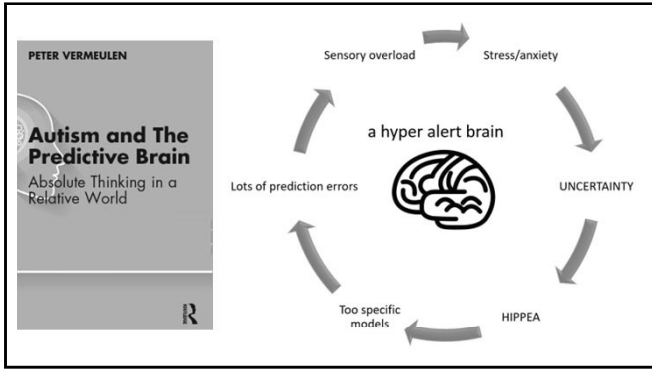
<https://www.spectrumnews.org>

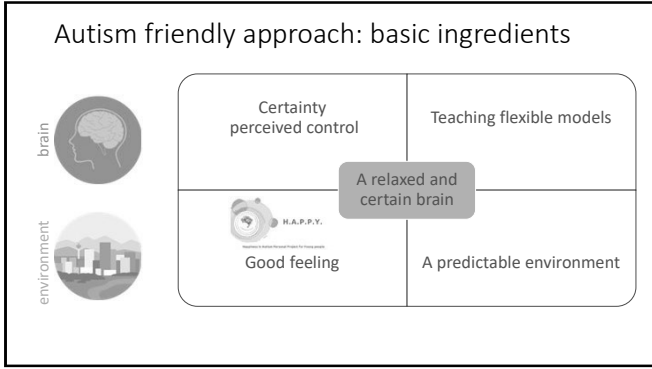
NEWS

Sensory overload in autism may stem from hypervigilant brain

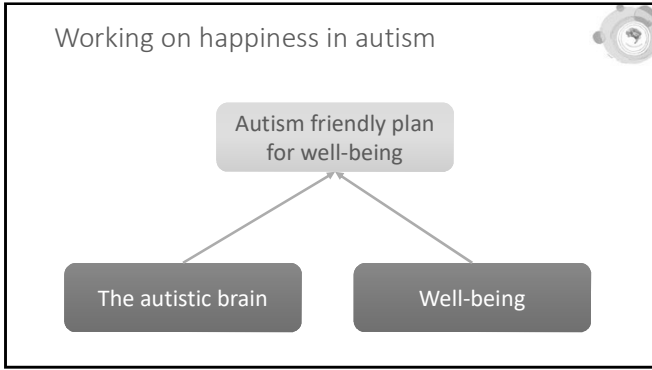
BY NICHOLETTE ZELIADT

29 JULY 2019









H.A.P.P.Y.

10 well-being strategies


1. Accepting and loving yourself
2. Good Feeling toolbox
3. Flow activities
4. Physical exercise
5. Problem focused coping strategies
6. Emotion focused coping strategies
7. Positive thinking
8. Gratitude
9. Kindness
10. Personal projects: learning something new

AUTISM in CONTEXT From neurodiversity to neuroharmony

More similarities than differences

Uncertainty is not new to us.
 We have coped with uncertainty before.
 We all experience prediction errors and uncertainty

AUTISM in CONTEXT From neurodiversity to neuroharmony




H.A.P.P.Y.
Happiness in Autism Personal Project for Young people

Strategies that address uncertainty

- Manage your worry-department
 - Worry box
 - Worry place and time
- Pride diary – positive diary
- But person
- Pointing out the similarities
- Clarify the world / context

"You have power over your mind, not outside events. Realize this and you will find strength."
Marcus Aurelius

AUTISM in CONTEXT From neurodiversity to neuroharmony




Tip!

Don not ask about worries / emotions.
Ask what questions the person has about something.

AUTISM in CONTEXT From neurodiversity to neuroharmony

Pushing the context button restores the balance

Will I get my own desk?	HR will listen to your concerns
What about the breaks?	All employees are allowed to take breaks
Who will be my new colleagues?	We can take a look at the website



AUTISM in CONTEXT From neurodiversity to neuroharmony

What do we NOT know?	What DO we know?
Who will be my staff in the supported living	That there will be support for me in my daily activities
How will my room look like	That I will have my iPad and other things I like to have with me
How often and when will my parents visit me	That I will be able to call my parents to ask them when they will come

HIPPEA requires pointing out the similarities


- There will be many new things in my new school
- But many things will also be the same:
 - There will be teachers
 - There will be lockers
 - There will be toilets
 - There will be breaks
 - There will be lunch time
 - School will be closed during holidays
 - There will be sanitizing hand gel

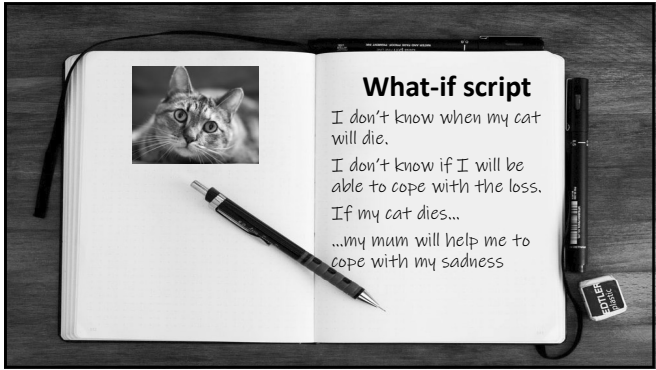
AUTISM in CONTEXT From neurodiversity to neuroharmony

THINK

- True?
- Helpful?
- Inspiring?
- Necessary?
- Kind?

T	IS IT TRUE? Is this fact or is it really an opinion or feeling? Know & be clear before you speak.
H	IS IT HELPFUL? Does it help you, them or the situation?
I	IS IT INSPIRING? Also, does it IMPROVE on the silence?
N	IS IT NECESSARY? Would this be better left unsaid?
K	IS IT KIND? What is your motivation for communicating?





Uncertainty, stress and control

Martin Seligman

Learned helplessness

Importance of control in stress

URBAN STRESS
 Experiments on Noise and Social Stressors

DAVID C. GLASS / JEROME E. SINGER

David C. Glass
 Jerome E. Singer

ACADEMIC PRESS
 New York San Francisco London 1972

Don't avoid challenges, but give control

Escape scenario


Script that clarifies what to do when it becomes too much

AUTISM in CONTEXT webshop


LECTURES BOOKS DOWNLOADS COURSES CONSULT Checkout Account Logout

Downloads


[Back to overview](#)



Autism Good Feeling Questionnaire Finnish



Autism Good Feeling Questionnaire Danish



Autism Good Feeling Questionnaire English

Routines are good for the mental health

Published in final edited form as:
J Abnorm Child Psychol. 2011 January; 39(1): 83-94. doi:10.1007/s10802-010-9447-5.

Family Routine Moderates the Relation Between Child Impulsivity and Oppositional Defiant Disorder Symptoms

H. Isabella Lanza and
Department of Psychology, Temple University, Philadelphia, PA, USA; Integrated Substance Abuse Programs, Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles, 1540 S. Sepulveda Blvd., Ste. 200, Los Angeles, CA 90025, USA
Deborah A. G. Drabick
Department of Psychology, Temple University, Philadelphia, PA, USA

Feature Article
Why Routines Matter: The Nature and Meaning of Family Routines in the Context of Adolescent Mental Illness

Fenske Koome MHS, Clare Hocking PhD & Daniel Sutton PhD
Pages 312-325 | Published online: 19 Sep 2012
Download citation: <https://doi.org/10.1080/14427591.2012.719245>

How to use prediction errors in a positive way

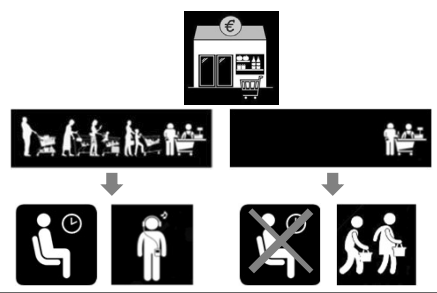
- Controlled and predictable variations in routines
- Teach flexible models by creating contextualized scripts
- Teach the brain to like surprises (eg. 4th movie starting with a certain letter)
- Humour!!! Use it. Laugh together. Safe surprises.

Contextualized scripts

- Mommy is going to pick me up at school at 3.30pm
- I wait for mommy at the school gate.
- If traffic is very busy, mommy could arrive later than 3.30.
- If mommy is not at school at 3.40pm, then I go back in and I go to the group room. I take my Gameboy and play until mommy comes in to pick me up.




Contextualized scripts



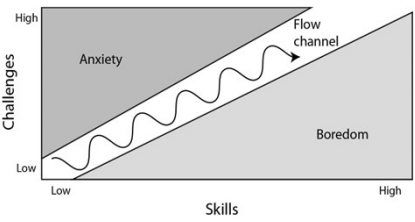
What if you have no access to the brain?

- Flow activities
- Physical exercise

Distraction: flow activities



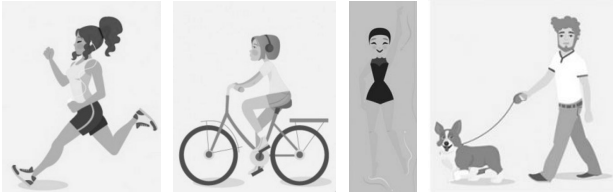
Mihaly Csikszentmihalyi



Distraction: flow activities

- Catch your attention
- Match your interests
- Stretch your skills a bit
- Have a goal that you have chosen
- You enjoy the journey, not the end

Physical exercise




Physical activities lower cortisol level and anxiety in autistic people (Hillier e.a., 2010, Hillier e.a., 2011, Carraro & Gobi, 2012)

Plan everything!

- The positive thinking
- The physical exercise
- The flow activities
- The worry time
- When to check things

• **The surprises**





AUTISM in CONTEXT
from neurodiversity to neuroharmony
www.petervermeulen.be

AUTISM IN CONTEXT PETER IN CONTEXT YOUR CONTEXT H.A.P.P.Y. -PROJECT CONTACT

THANK YOU FOR YOUR ATTENTION

peter_autisme

