Thinking Meets Worrying: What Happens Next?

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Funding: NIH 2R01HD04269 (Simon), K99MH086616 (Beaton),
UC Davis CEDD, UC Davis T32 MCRTP (Stoddard/Angkustsiri),
Dempster Family Foundation

Center for Excellence in Developmental Disabilities
Thinking & Feeling Directly Interact!

Cognitive impairments limit competence in numerous domains
- but vary widely among children and across ages

Despite cognitive limitations some children outperform predictions from testing while others fall very short
- “copers” show lower anxiety, higher real world functioning and often achieve in academics far beyond what cognitive testing would predict
- “strugglers” show the reverse pattern - more anxiety poorer adaptive functioning and worse academics
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Our new focus on “cognitive-affective interactions” shows how the relationship of these two powerful forces can influence outcomes. Allows a sharper focus on how to optimize learning, increase quality of life and possibly reduce risks for serious psychiatric outcomes.

This will be the focus of the longitudinal grant to be submitted this year.
Attention - Selection & Filtering

Attention: resolves competition between items in environment
- can be “top-down” - controlled by goals or plans (volitional)
- can be “bottom-up” - driven by objects/events in the world (reactive)
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Figure 1. Focusing Attention and Reorienting Attention Recruit Interacting Networks
(Left panel) Focusing attention on an object produces sustained activations in dorsal frontoparietal regions in the intraparietal sulcus, superior parietal lobule, and frontal eye fields, as well as visual regions in occipital cortex (yellow and orange colors) but sustained deactivations in more ventral regions in supramarginal gyrus and superior temporal gyrus (TPJ) and middle and inferior prefrontal cortex (blue and green colors). (Right panel) When an unexpected but important event evokes a reorienting of attention, both the dorsal regions and the formerly deactivated ventral regions are now transiently activated.
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A big question is “What is relevant or salient”?
- usually defined in “cold”, objective terms to simplify experiments
- but now we are starting to look what changes when things get “hot”
“Cold Cognition: Attention”

One of our experiments compared top-down (Endo) and reactive (Exo) reorienting in TD kids (37) & those with 22q (46)

Compared attentional control within each kid & between the two groups. Also looked at the effect of age (7-14)
"Cold Cognition: Attention"

Cue cost is extra time to find target when cue indicates wrong location
- reactive control (exo) in kids with 22q is just like TD
- BUT, kids with 22q do much worse when they have to generate the reorienting, “top down” or volitionally (endo)

![Graph showing cue cost and adjusted reaction times for different cueing conditions and groups.](image)

Figure 2 General results of the endogenous-exogenous cueing task.
“Cold Cognition: Attention”

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HOWEVER, that impairment only seems to exist in our 7-10 yr olds

BUT, first few school grades is a critical age range to be impaired in!

Of course, well-matched “copers” may compensate and do better
“Hot Cognition: Attention”

New tasks manipulate emotional content with different faces to see if “threat” changes functioning. *Dot Probe Threat Bias* is affective Exo task anxious children orient attention to “threat”, losing some control.
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Threat, Anxiety and Attention

Results suggest 22q group orient toward to negative affect (threat bias)
- this impairs control of attention and increases negative arousal
- threat bias thought to increase anxiety risk, correlations suggest this
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![Graph of MASC Parent: Harm Avoidance and MASC Parent: Anxiety Disorders](image-url)
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![Graphs showing MASC Parent: Harm Avoidance and MASC Parent: Anxiety Disorders](attachment:image.png)
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Recall that reactive Exo control was not impaired in 22q across ages. Trends suggest a stronger threat/anxiety link in younger kids for angry faces. Trends also suggest more anxious older kids avoid happy faces more.
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What does this actually look like? How “distracting” is threat?

- Movie #1 a typical child with no threat bias
- Movie #2 a child with 22q with a strong threat (i.e. angry face) bias
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“Cold Cognition: Cognitive Control”

Tests ability to withhold inappropriate responses

- “Go” trials (75%): press a button as quickly as possible to “whack” the mole
- “No-Go” trials (25%): do NOT press button to avoid “squashing” the vegetable
- Preceded by 1, 3, or 5 “Go” trials
“Cold Cognition: Cognitive Control”

Correct Hit

Correct Withholding

Go Accuracy (%) vs. Go Trial

No-Go Accuracy (%) vs. Go Trial

RT Difference (ms) (post-error minus post-correct)

Overall Younger Older

Accuracy (%)
Correct Hit

Correct Withholding

No-Go Accuracy (%)

Go Accuracy (%)

Go Trial

Go Trial

No-Go Trial Type

(# Preceding Go Trials)

TD

22q

TD

22q

‘Cold Cognition: Cognitive Control’
No group difference in Go accuracy. Children with 22q had difficulty withholding a response after 5 Go trials.
Whacking moles & protecting vegetables is all very well but ..... What happens when what you want to do really COUNTS?
“Hot Cognition: Cognitive Control”

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Whoa, that was stressful! And it was about something that feels good. What happens if you have to control yourself when things feel bad?
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Original “Cold Cognition” Data

These two tasks both require “retroactive control” ->

This is one requires prospective control modulated by affect
“Hot Cognition: Cognitive Control”

Original “Cold Cognition” Data

Correct withholding

No-Go Accuracy (%) vs. No-Go Trial Type (# Preceding Go Trials)

Kids see 1-5 neutral Go faces

Correct No Go to Happy or Angry face

Very Preliminary data from just 7 kids with 22q

Kids see 1-5 Happy or Angry faces

Correct No Go to Neutral face

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Original “Cold Cognition” Data

Thursday, April 25, 13
“Hot Cognition: Cognitive Control”

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![Graph showing No-Go Accuracy (%) for different No-Go Trial Types](image)

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- Kids see 1-5 Happy or Angry faces
- Correct No Go to Neutral face

Original “Cold Cognition” Data

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Wednesday, April 25, 13
Arousal, Anxiety & Inattention

Michelle Y Deng, Ph.D.
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ADHD and Anxiety

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ADHD and Anxiety

Color Key

Value

Anxiety

ADHD

Neither

Anxiety+ADHD

ADHD

Anxiety

Neither

22q11.2DS participants

0 0.5 1 1.5 2

Value

Michelle Y Deng, Ph.D.
Arousal, Anxiety & Inattention

Michelle Y Deng, Ph.D.
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Shorter term implications
- quality of life, social competence, academic progress, family dynamics
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What can you do? - try to improve “calibration” and use evidence based therapies
Cognitive Abilities
Cognitive Abilities

Everyday Demands
Stimulation
Thanks

MOST important: Kids who participated & their families!!

Majority of the work presented here was done by:

- Josh Cruz, Nina Cung, Margie Cabaral, Freddy Bassal, Heather Shapiro, Ling Wong, Elliott Beaton Ph.D., Siddarth Srivastava Ph.D., Michelle Deng Ph.D., Joel Stoddard, M.D., Danielle Harvey, Ph.D., Naomi Hunsaker, Ph.D., Kathy Angkustsiri M.D., Nicole Tartaglia M.D., Ingrid Leckliter Ph.D., Janice Enriquez Ph.D.

With important contributions from:

- Tracy Riggins Ph.D., Yukari Takarae Ph.D., Mendoza M.A., Leeza Kondos & others

- UC Davis Center of Excellence in Developmental Disabilities