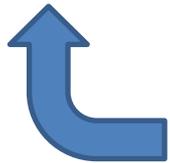
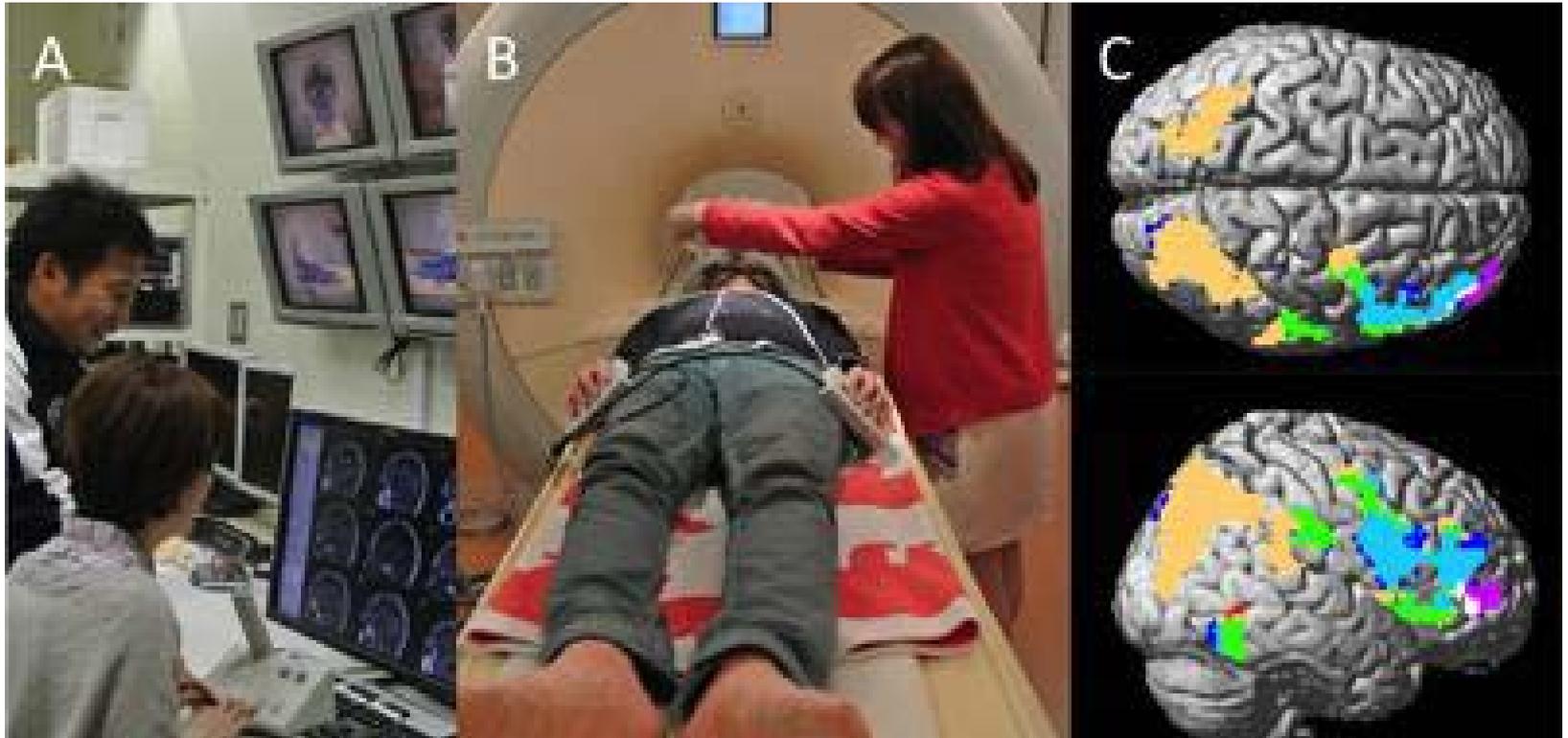


5th International Workshop on Psychological intervention after Disasters
Nov. 17th, 2016, Manila

Eight Personal Characteristics Associated with
the **Power to Live** with Disasters
as Indicated by Survivors of
the 2011 Great East Japan Earthquake Disaster

Motoaki Sugiura
Tohoku University

Cognitive Neuroscience



D



Tohoku University



Institute of Development,
Aging and Cancer



International Research Institute of
Disaster Science



Outline

- **Power to live** with disasters
 - What is it and how was it built?
- Cognitive Science Approach
 - Purpose
 - Methods

the 2011 Great East Japan Earthquake Disaster



Power to live with disasters

- March 11th, 2011- (@Sendai)
 - Some personal characteristics have advantage
 - personality trait, way of thinking, & habit (**Power to live**)
 - => Inventory construction!
- 2012: Interview with survivors (n=78)
 - Disaster experience and opinion about power to live



Power to live with disasters

- March 11th, 2011- (@Sendai)
 - Some personal characteristics have advantage
 - personality trait, way of thinking, & habit (**Power to live**)
 - => Inventory construction!
- 2012: Interview with survivors (n=78)
 - Disaster experience and opinion about power to live
 - 700 opinions => 40 items of power to live
- 2013: Questionnaire survey (n=1412)
 - Self-descriptiveness
 - 40 items of power to live => Factor analysis
 - Behaviors/experiences in Disaster (160 items)

Power to live with disasters

- Factor analysis => 8 factors
- Labeling:

Power to live with disasters

- Factor analysis => 8 factors
- Labeling: F2 (for example)
 - When I am fretting about what I should do, I compare several alternative actions.
 - Before taking action, I think of a plan and the order of priority.
 - When talking to someone, I think about that person's personality, wishes, and abilities and choose an appropriate attitude and words accordingly.
 - The more agitated the people around me become, the calmer I somehow become.
 - In order to resolve a problem, I first of all initiate action.

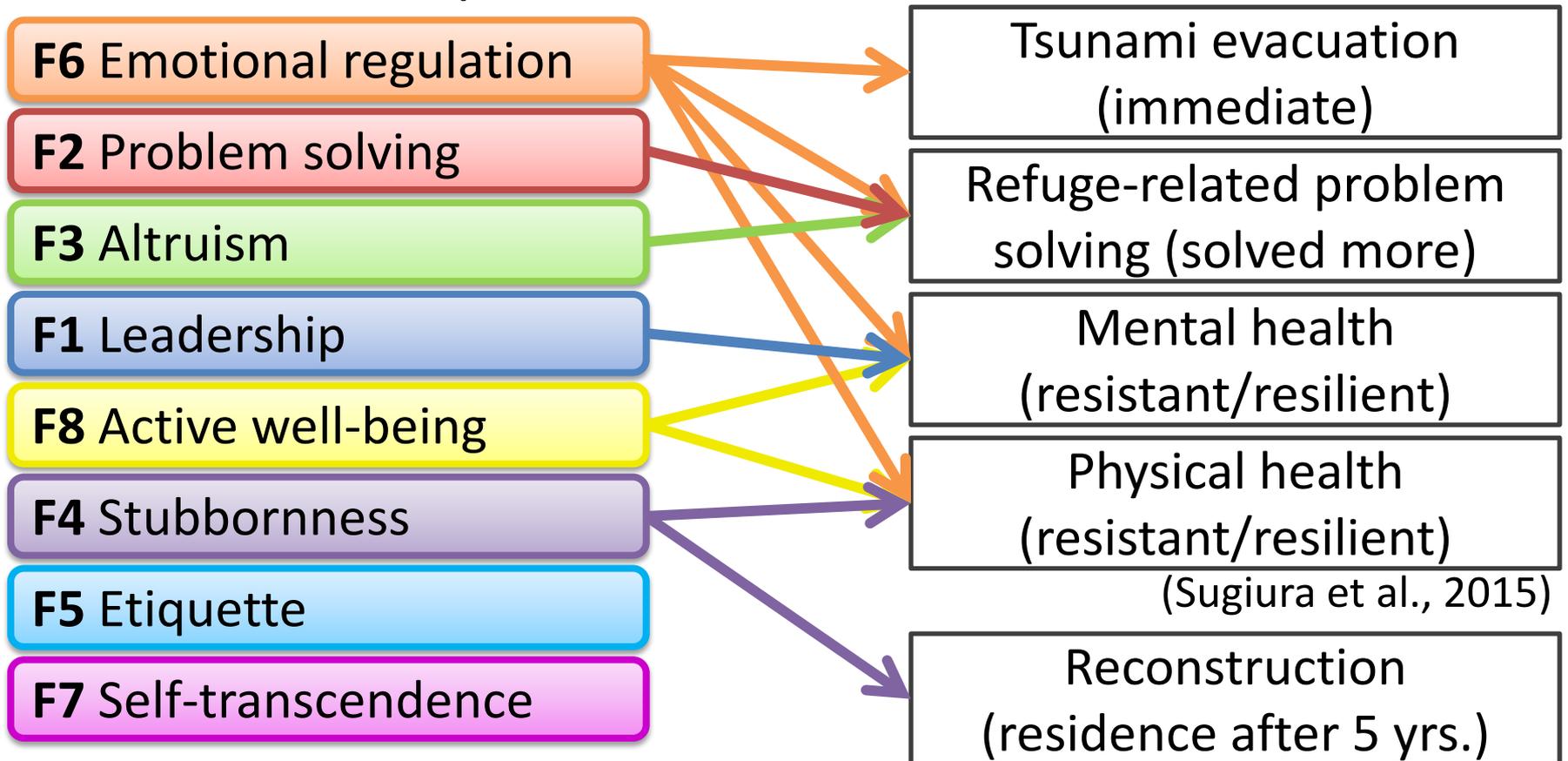
Power to live with disasters

- Factor analysis => 8 factors
- Labeling: **F2 Problem solving**
 - When I am fretting about what I should do, I compare several alternative actions.
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Breakout
group work

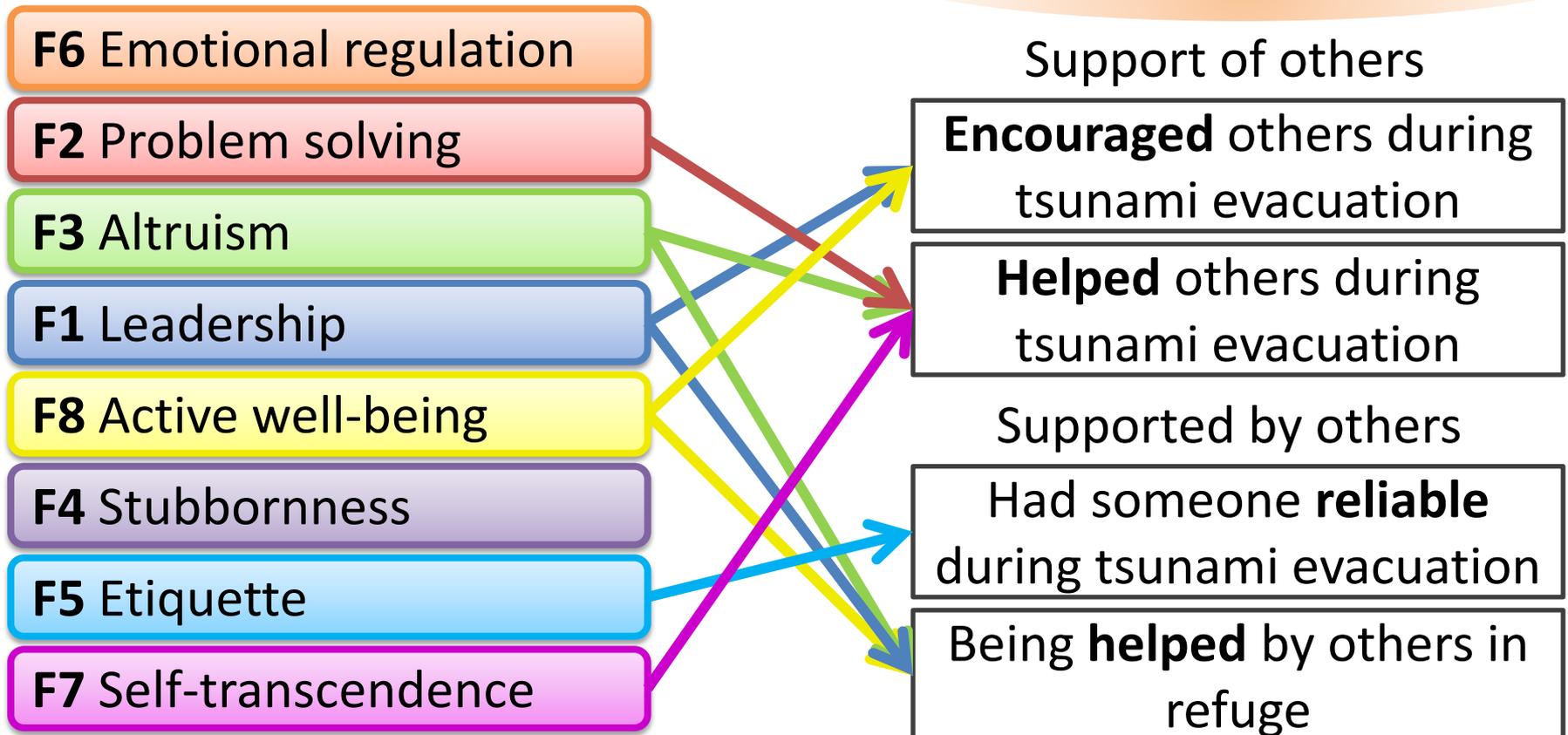
Power to live with disasters

- Contribution to behaviors/experiences in Disaster
 - Context dependent!



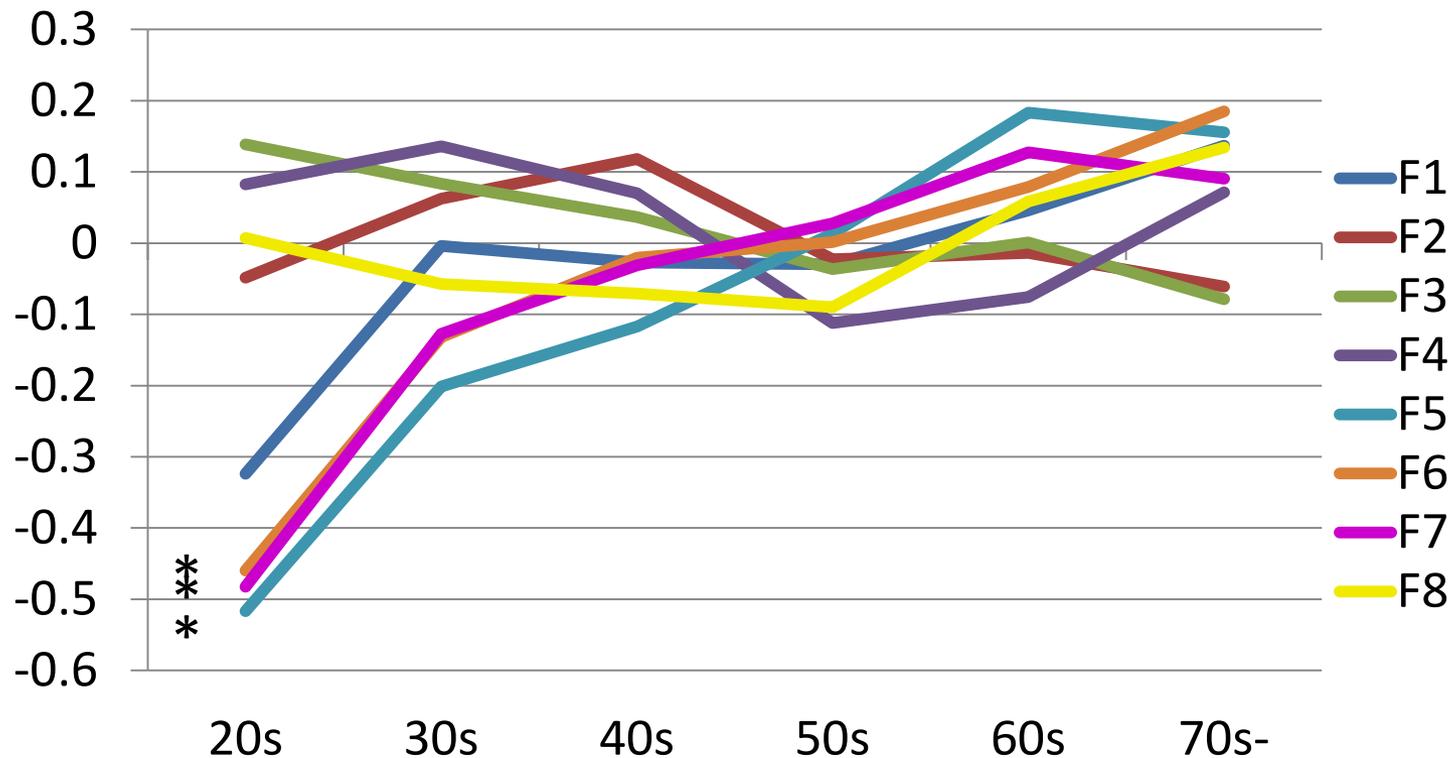
Power to live with disasters

- Contribution to behaviors/experiences in Disaster
 - Context dependent!



Power to live with disasters

- Age-related change
 - Different across factors: different educational approach



* : $p < .05$ (F-test, Bonfferoni corrected)

Power to live with disasters

- Inventory application
 - Evaluation of the effect of training program
 - As material of disaster education
 - In other languages...



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Cognitive Science Approach

- Purpose
 - Is each factor reflected in **behavioral performance**?
 - self-report bias
 - causality
 - What **mental process** behind each factor?
- Application
 - Performance measure
 - => Objective measurement tool
 - Also for children
 - Mental process
 - => Better understanding of the human responses to the disaster
 - => Development of training/educational methods

Cognitive Science Approach

- Methods

- Behavioral experiment

- Hypothesis (cognitive model)
 - Subjects: ordinary people; students
 - Task/Materials: “mock disaster” in part (≤hypothesis)
 - Conditions: manipulate the key factor (≤hypothesis)
 - Measurement: behavioral performance (≤hypothesis)
 - Analysis: factor score ↔ behavioral **performance**

Breakout
group work

Cognitive Science Approach

F2 Problem solving

- Hypothesis (cognitive model):
 - F2 is associated with problem solving, particularly under time pressure (TP)
- Subjects:
 - 30 university students
- Task/Materials:
 - LEGO composition reproduction task
- Conditions:
 - With/without TP
- Measurement:
 - Accuracy
 - Time spent for the task
- Analysis:
 - F2(high/Low) x TP(with/without) ANOVA



00:59:57

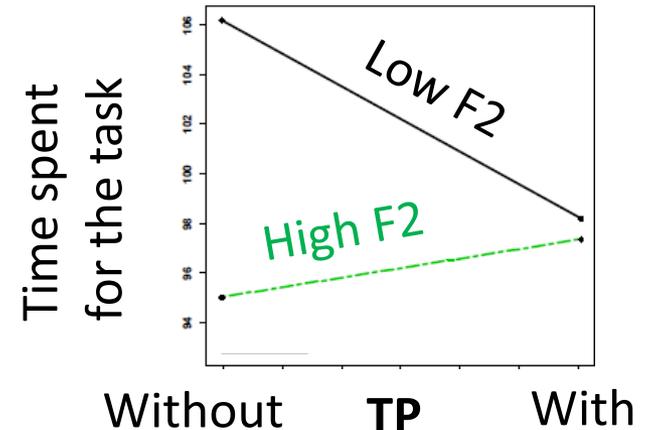


Cognitive Science Approach

F2 Problem solving

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 - Time spent for the task
- Analysis:
 - F2(high/Low) x TP(with/without) ANOVA

- Accuracy: n.s.
- Time spent for the task:
significant interaction



High F2: less TP effect
Resistant to external pressure?

Cognitive Science Approach

- Methods

- Brain measurement (fMRI)

- Hypothesis (cognitive model)
 - Subjects: ordinary people; students
 - Task/Materials: “mock disaster” in part (\leq hypothesis)
 - *restricted measurement environment*
 - Conditions: manipulate the key factor (\leq hypothesis)
 - *at least 12 trials for each condition*
 - Measurement: **neural response**
 - *Neural activity \Rightarrow Regional blood supply \Rightarrow MR signal*
 - Analysis: factor score \Leftrightarrow **regional neural response**
 - *Interpret using neuroscientific knowledge*



Cognitive Science Approach

F2 Problem solving

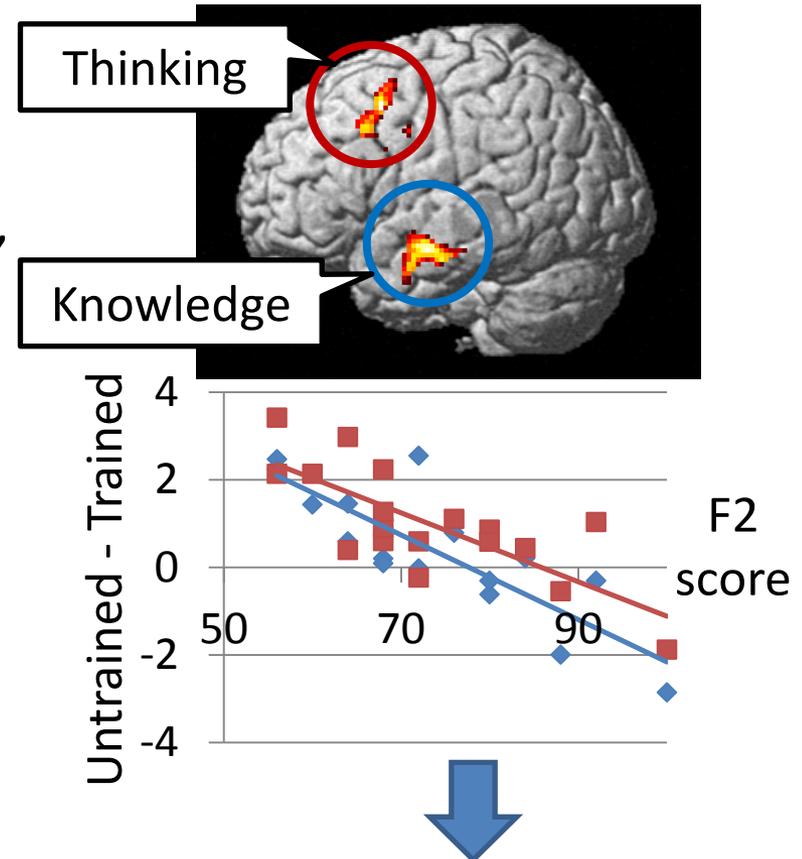
- Hypothesis (cognitive model):
 - F2 is associated with problem solving, particularly for unexpected situation
- Subjects:
 - 18 university students
- Task/Materials:
 - Operation of the complex system (electricity supply control) after training
- Conditions:
 - Trouble **trained** (in manual)
 - Trouble **untrained** (not in manual)
- Measurement: fMRI
- Analysis:
 - F2 regression on [Untrained – Trained]



Cognitive Science Approach

F2 Problem solving

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High F2: less difference!
Always think the same
(may be logical) way?

Breakout group work

- 1: Choose one (or more) P2L factor and give a better label than the original
 - *Reasons for the choice (the member's background)*
 - *Reasons for the new label (experience, literature)*
- 2: Create the hypothesis (cognitive model) of the mental processes underlying the factor.
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- 3a (optional): Design fMRI experiment
 - *N.B.: restricted measurement environment; at least 12 trials for each condition*
- 4: Implementation of the findings into the practice
 - *Tool development, Training/Education, Policy making, etc.*
 - *Target, Benefit*

Power to live with disasters

- Labeling: F4
 - I am stubborn and always get my own way.
 - I unhesitatingly say whatever it is I want to say.
 - I clearly distinguish between black and white: what's good is good, and what's bad is bad.
 - I hate losing.
 - I am highly motivated with regard to things that I like or want to do.

Power to live with disasters

- Labeling: **F4 Stubbornness**
 - I am stubborn and always get my own way.
 - I unhesitatingly say whatever it is I want to say.
 - I clearly distinguish between black and white: what's good is good, and what's bad is bad.
 - I hate losing.
 - I am highly motivated with regard to things that I like or want to do.
- Contributed to:
 - Physical health (resistant/resilient)
 - Reconstruction (residence after 5 yrs.; fast)

Cognitive Science Approach

F4 Stubbornness

- Hypothesis (cognitive model):
 - F4 may affect decision making on future
- Subjects:
 - 30 university students
- Task/Materials/Conditions
 - Economical choice
 - Earlier low vs. Later high value
- Measurement:
 - Time discounting rate

Which option would you choose?

- | | | |
|-----|---------------------------|------------------------------|
| (1) | A: Get \$3,400 this month | B: Get \$3,800 next month |
| (2) | A: Get \$100 now | B: Get \$140 a year later |
| (3) | A: Get \$100 now | B: Get \$110 within 10 years |

Cognitive Science Approach

F4 Stubbornness

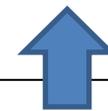
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 - 30 university students
- Task/Materials/Conditions
 - Economical choice
 - Earlier low vs. Later high value
- Measurement:
 - Time discounting rate

High F4: Low time discounting
Hope for the future?
Less anxiety?

Which option would you choose?

- (1) A: Get \$3,400 this month
- (2) A: Get \$100 now
- (3) A: Get \$100 now

- B: Get \$3,800 next month
- B: Get \$140 a year later
- B: Get \$110 within 10 years



Power to live with disasters

- Labeling: F6
 - During difficult times, I endeavor not to brood.
 - During difficult times, I endeavor to think positively, telling myself that this experience will benefit me in the future.
 - During difficult times, I compare myself with the situation around me and in society, and I think that matters cannot be helped.
 - When something happens, I try to stay calm and not panic.

Power to live with disasters

- Labeling: **F6 Emotional regulation**
 - During difficult times, I endeavor not to brood.
 - During difficult times, I endeavor to think positively, telling myself that this experience will benefit me in the future.
 - During difficult times, I compare myself with the situation around me and in society, and I think that matters cannot be helped.
 - When something happens, I try to stay calm and not panic.
- Contributed to:
 - Tsunami evacuation (immediate)
 - Refuge-related problem solving (solved more)
 - Mental health (resistant/resilient)
 - Physical health (resistant/resilient)

Cognitive Science Approach

F6 Emotional regulation

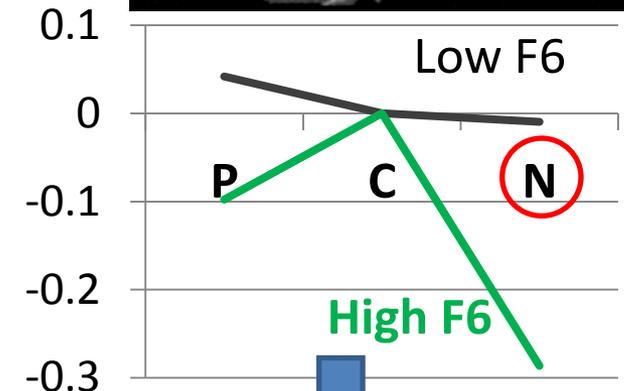
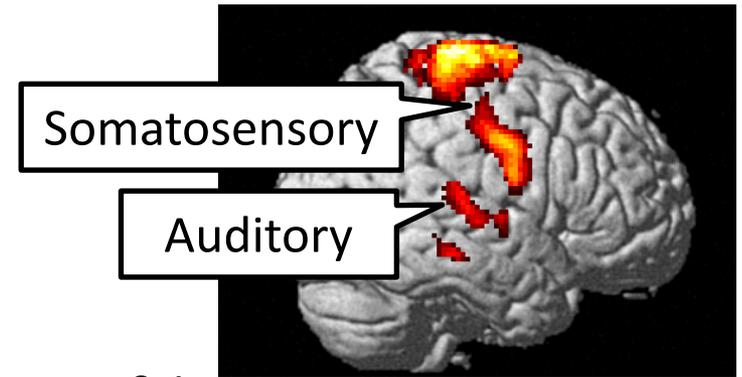
- Hypothesis (cognitive model):
 - F6 may affect processing of negative (but not neutral) emotional stimuli
- Subjects:
 - 40 university students
- Task/Materials:
 - Viewing picture
- Conditions:
 - Positive
 - Control (neutral)
 - Negative
- Measurement: fMRI
- Analysis:
 - F6 regression on [Negative – Control]



Cognitive Science Approach

F6 Emotional regulation

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High F6: perceptual suppression for negative emotional input

Unconscious process?

Summary

- 8 factors of the **Power to Live** with disasters
 - Associated with disaster survival (mostly self-report)
- Cognitive science approach
 - Correlates with them with:
 - Behavioral performance
 - Mental process
 - Practical implication

F2 Problem solving

F4 Stubbornness

F6 Emotional regulation



Take home 1

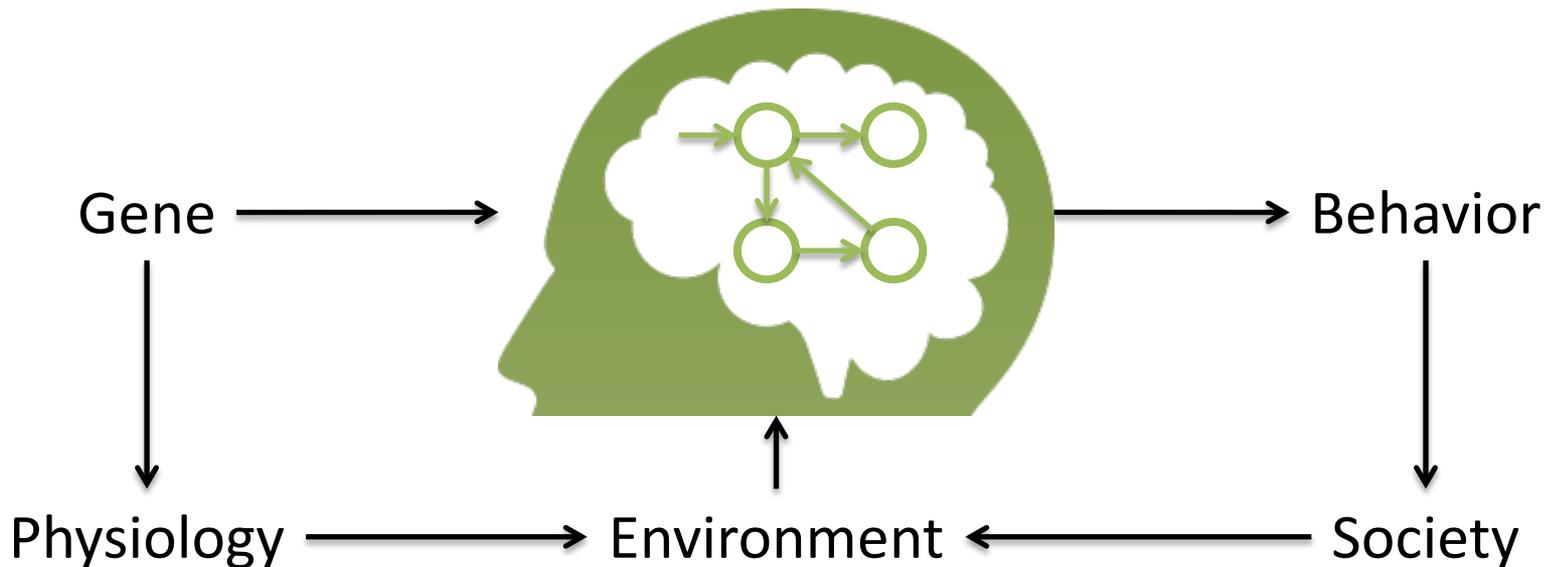
- Cognitive Science Approach
 - Just began; please join us!

● Significant finding

		Behavior	fMRI
F1	Leadership		
F2	Problem solving	●	●
F3	Altruism		
F4	Stubbornness	●	○
F5	Etiquette		
F6	Emotional regulation	○	●
F7	Self-transcendence		
F8	Active well-being		○

Take home 2

- Cognitive Science Approach
 - Key to:
 - The understanding of human responses to the disaster
 - Development of training/educational methods



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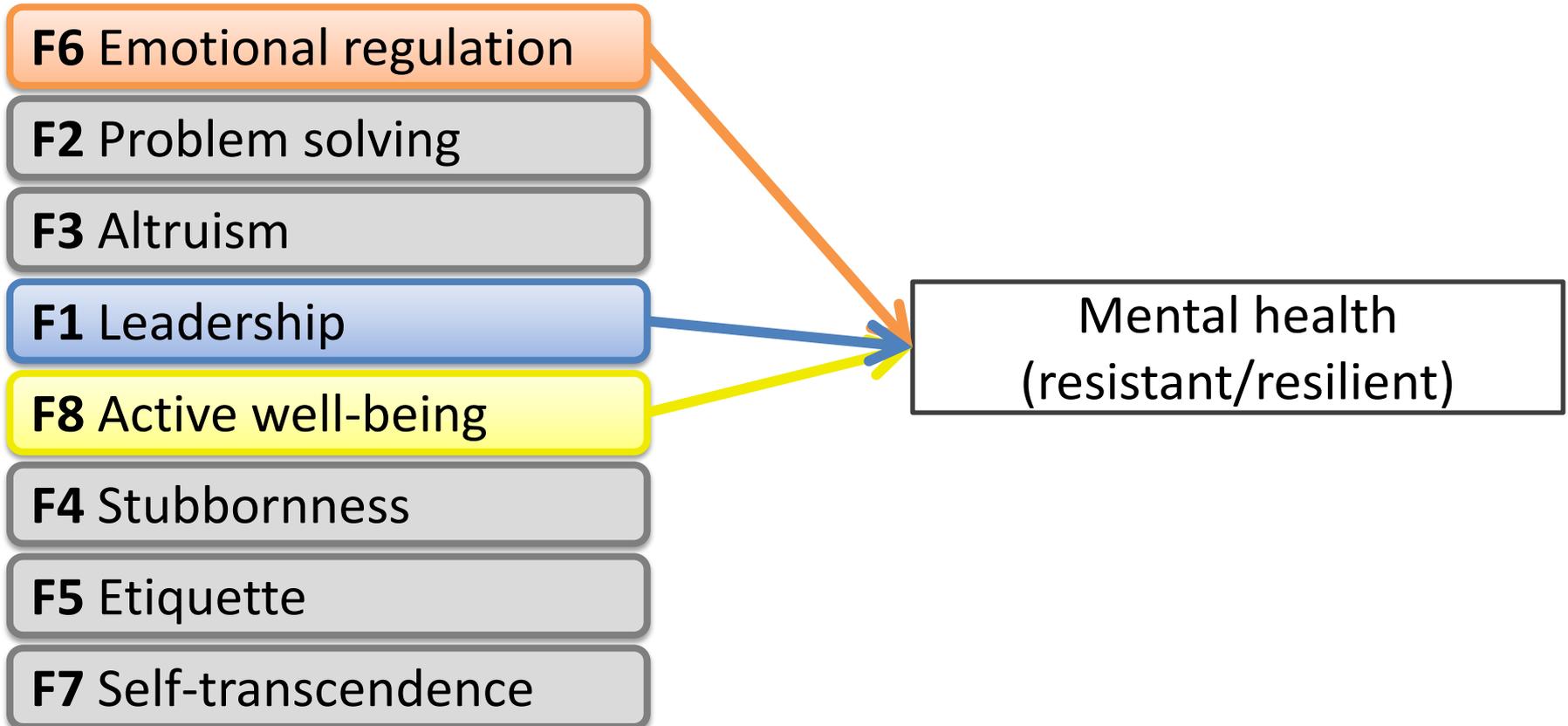


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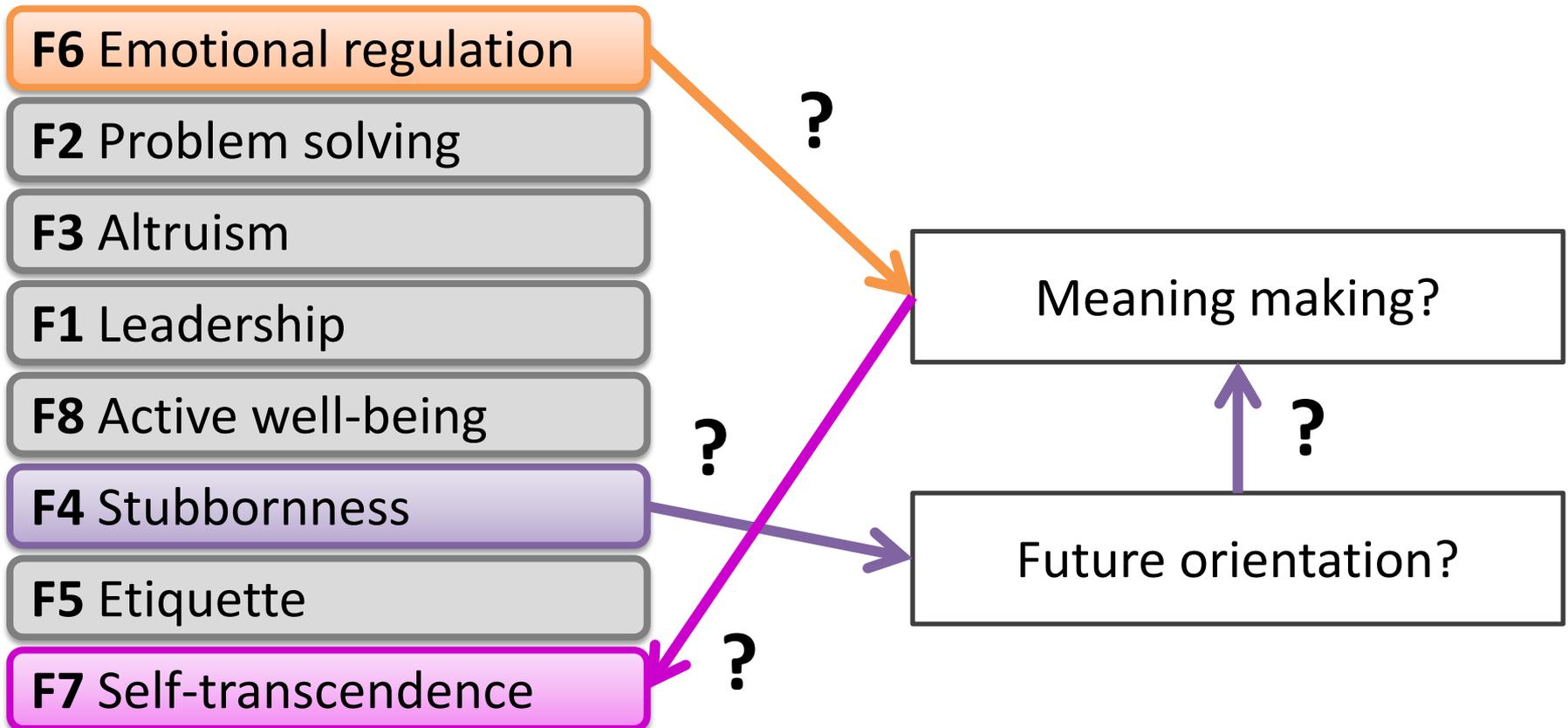
Power to live with disasters

- Contribution to behaviors/experiences in Disaster
 - Context dependent!



Power to live with disasters

- Contribution to behaviors/experiences in Disaster
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Self-evaluation

Describes you?

Extraverted

Yes <=> No

**Semantic
judgment**

Preferred?

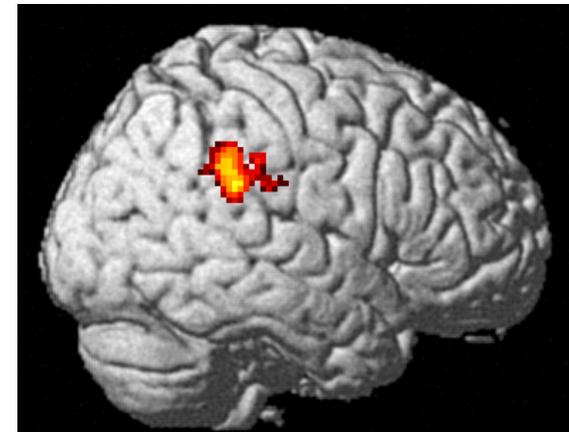
Extraverted

Yes <=> No



Regression on [Self – Semantic]

HighF4 > Low F4



HighF8 > Low F8

