



DEFENSE PROJECT KICK-OFF

Understanding Seismic Risk Perception: Psychological Drivers and Behavioral Implications

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Who We Are and Why We're Here



Research Background

The research team focuses on understanding core cognitive and psychological functions—perception, memory, and emotion—across diverse demographics, including general and aging populations.

The team’s previous research has delved into the complexities of risk perception concerning environmental hazards, with a particular emphasis on the psychological dimensions of climate change.



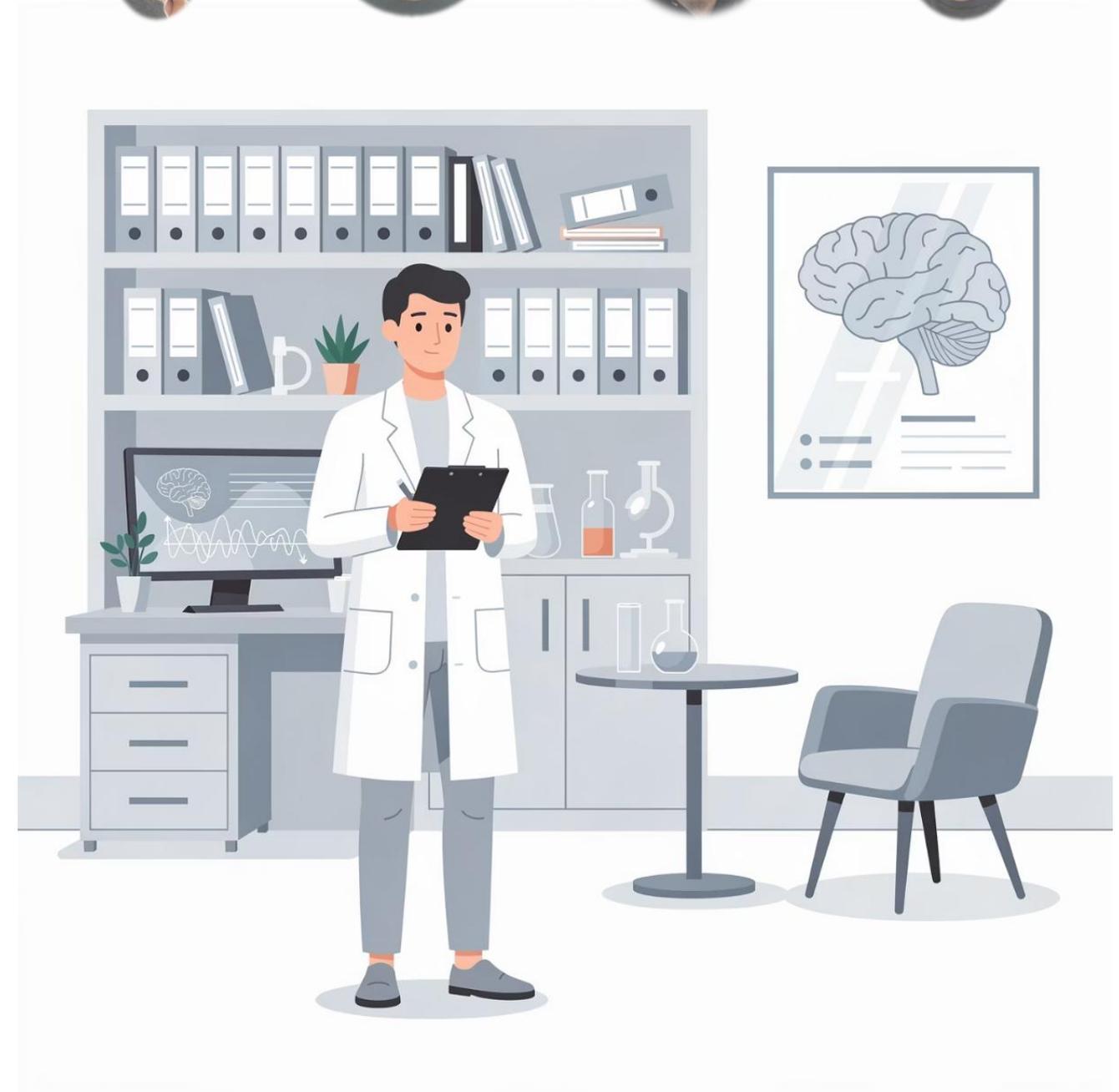
Core Expertise

Basic cognitive science: how people perceive and react to stimuli

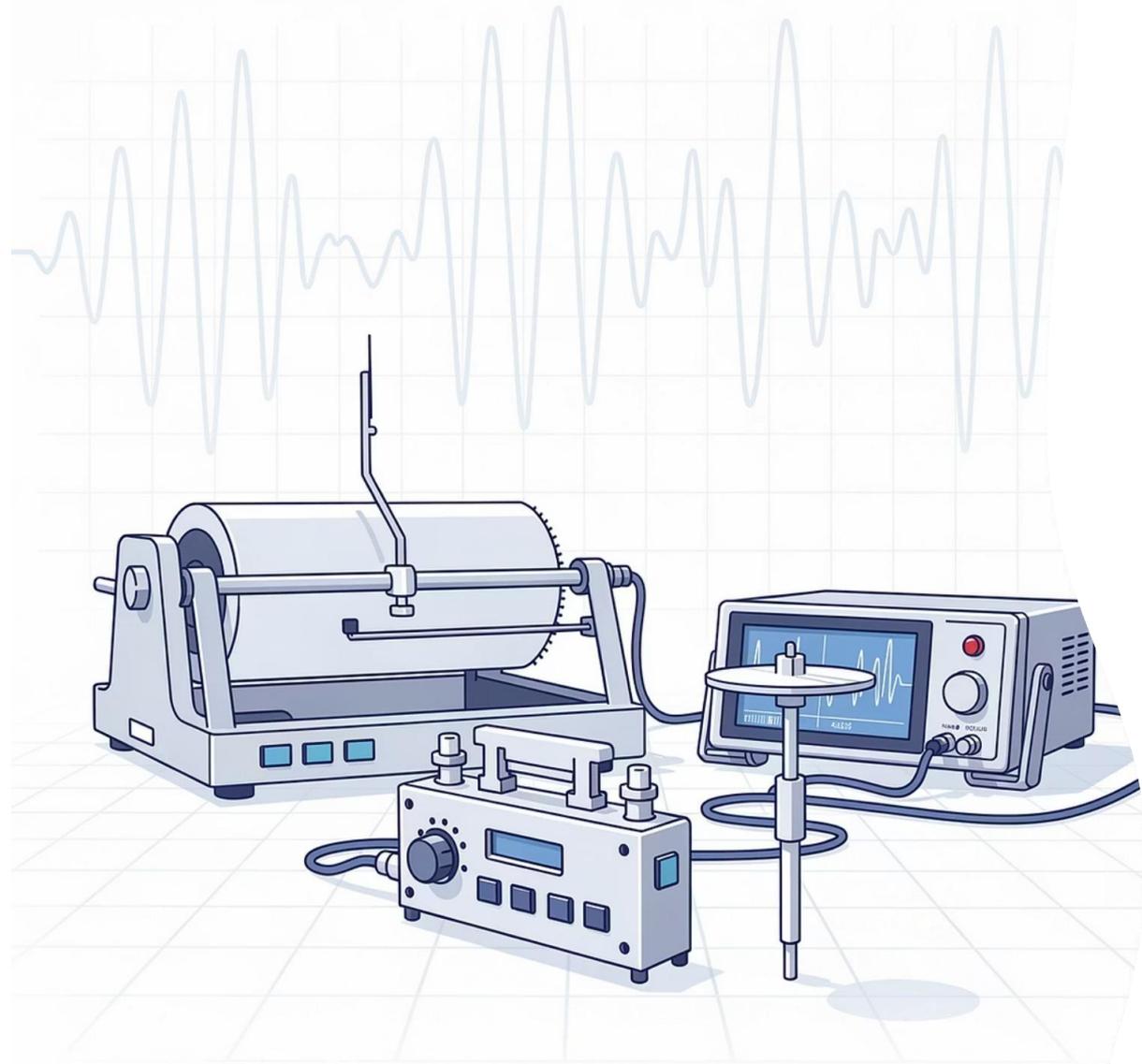


Applied Focus

Risk psychology: how people understand threats and decide to act



Our contribution combines fundamental perception science with applied disaster psychology — essential for turning seismic models into actionable community resilience.



DEFENSE in Context

01

Funding & Framework

Italian Ministry of University and Research via Italian Science Fund (FIS2)

02

Scientific Goal

Develop 3D dynamic models of seismic rupture using geological and geophysical constraints

03

Social Impact Mission

Increase public awareness through accessible communication and outreach tools

04

Ultimate Vision

Build communities that are prepared, resilient, and capable of living safely with seismic risk

- ❑ DEFENSE aims beyond scientific advancement alone—it targets measurable social impact through evidence-based risk communication that bridges technical expertise and community action.

Why Psychology Matters: Two Types of Risk



Objective Risk



What Earth sciences measure: hazard probability, rupture scenarios, ground motion intensity, expected impacts

The risk "out there in the world"

Subjective Risk



What people perceive: personal relevance, likelihood, controllability, urgency, actionability

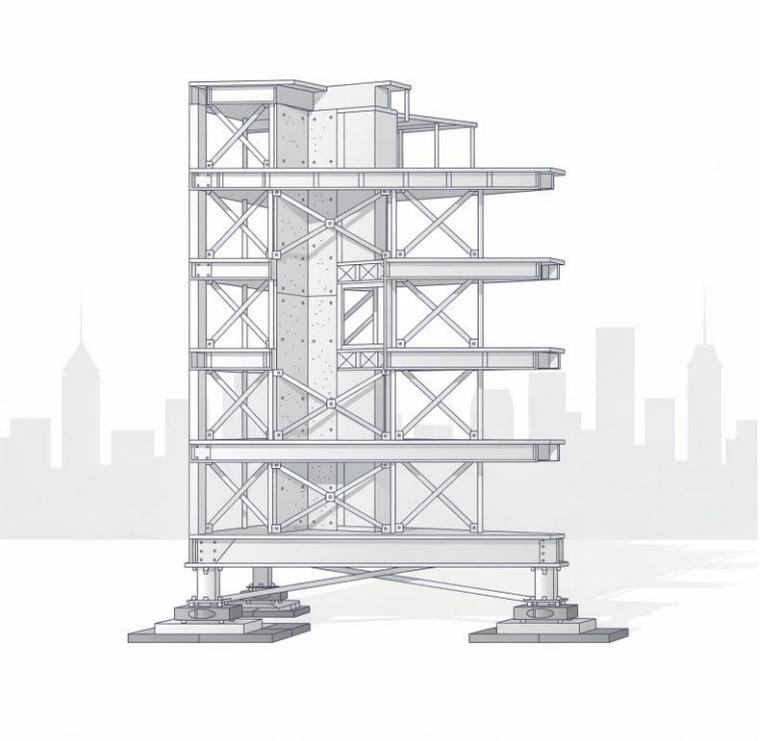
The risk "in the mind"

People don't act on objective risk—they act on perceived risk.

When scientific high-risk zones feel psychologically distant ("not here, not now, not me"), preparedness remains low regardless of technical evidence.

Our role: reduce the gap between what science demonstrates and what communities internalize as personally relevant and actionable.

Earthquakes Demand Adaptation, Not Mitigation

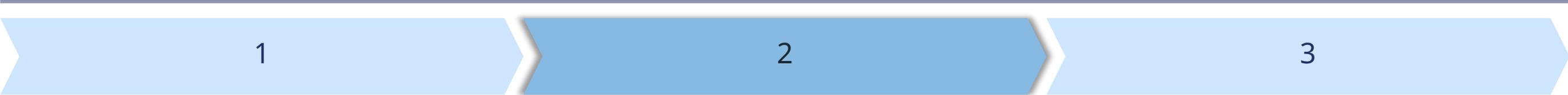


Why Adaptation Is Key

Unlike climate change, earthquakes offer no mitigation pathway—we cannot "switch off" tectonic forces. The entire challenge centers on **adaptation and resilience**.

Effective adaptation requires more than infrastructure. It demands psychological readiness.

- Knowledge
Understanding what protective actions to take
- Motivation
Being willing to invest time and resources
- Self-efficacy
Believing actions are useful and achievable
- Trust
Confidence in information sources and authorities
- Emotional Processing
Managing fear without avoidance or denial



Underestimation
"Won't happen to me"

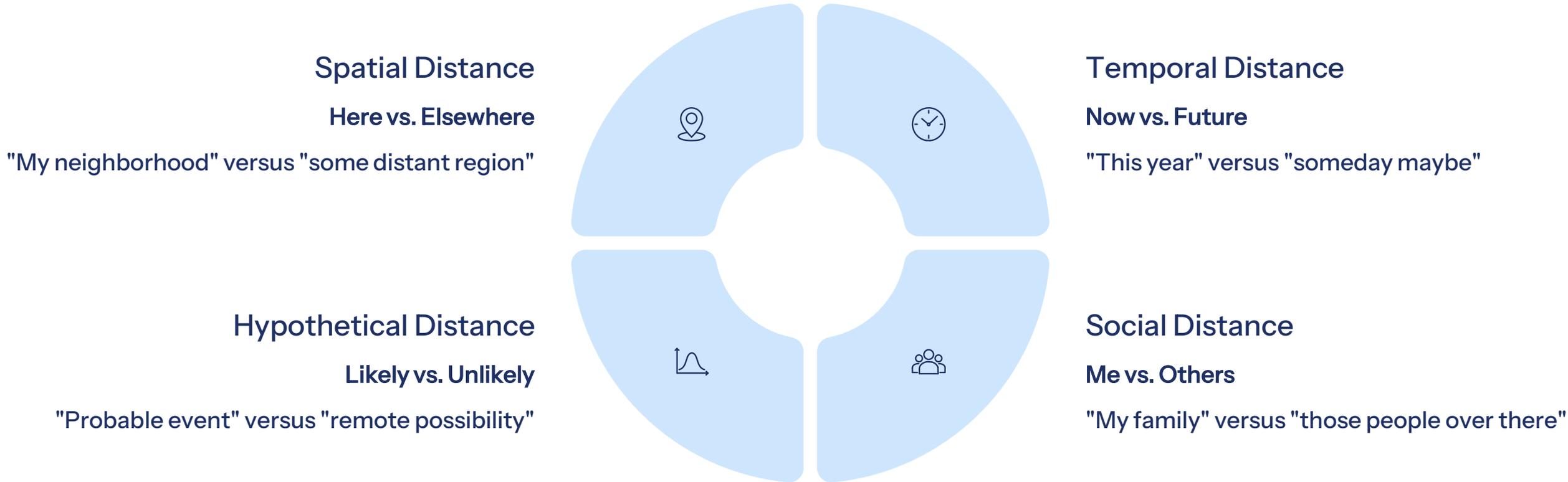
Effective Strategy
Realism + Concrete Actions

Overload
"Too frightening to face"

Our work increases risk perception without triggering counterproductive fear or denial — avoiding the boomerang effect of "psychological terrorism".

Psychological Distance: When Risk Feels Real

Construal Level Theory explains how events feel concrete versus abstract based on perceived "closeness."
This profoundly affects whether people prepare or procrastinate.



When risk feels psychologically close, people pay attention, process information realistically, and adopt protective behaviors.
When it feels distant and abstract, it remains background noise—acknowledged but not acted upon.

DEFENSE's challenge: translate scientific outputs into messages that strategically reduce psychological distance without harmful side effects.

Common Psychological Barriers to Earthquake Preparedness

Rare-but-severe risks like earthquakes trigger predictable cognitive and emotional obstacles. Effective communication must address these barriers directly.

Normalcy Bias

"If it didn't happen yesterday, it won't happen tomorrow." Past safety creates false confidence about future safety.

Unrealistic Optimism

"It can happen, but not to me or here."
People systematically underestimate personal vulnerability compared to others.

Fatalism

"There's nothing we can do anyway."
Perceived lack of control leads to passive acceptance rather than preparation.

Emotional Avoidance

"Thinking about it makes me too anxious."
Discomfort triggers information avoidance and denial.

Low Self-Efficacy

"Even if I prepare, it won't make a difference."
Doubting the effectiveness of protective actions prevents taking them.

❏ Risk communication must be informative *and* psychologically sustainable—increasing both perceived efficacy and institutional trust while respecting emotional limits.

Study 1: Psychological Distance and Risk Adaptation



Research Context

Our systematic review examined how psychological distance influences climate change perception and behaviors, distinguishing mitigation from adaptation responses.

Key Findings Applicable to Seismic Risk

1 Closeness Drives Preparedness

Across multiple studies, perceiving climate change as temporally, spatially, and socially close significantly increased adaptation and resilience behaviors.

2 Complexity Requires Care

Effects weren't universally linear—some populations and behaviors showed inconsistent patterns, indicating psychological distance must be managed strategically.



Translation to earthquakes: Make risk concrete and manageable—more "addressable"—without weaponizing fear.
The goal isn't to scare people more; it's to make preparation feel relevant, achievable, and worthwhile.

Reducing Psychological Distance: Practical Strategies

Effective seismic communication brings risk closer *without* catastrophism, emphasizing actionable steps and collective efficacy.



Territorial Specificity

Use local examples: "Here in your town" with clear, relevant information about fault lines and building codes.



Comparative Scenarios

Show concrete differences between prepared and unprepared families—real outcomes, not abstract statistics.



Incremental Actions

Break preparation into small, realistic steps: "What you can do today in 10 minutes, this week, within one month."



Collective Framework

Link individual actions to community systems: schools, local authorities, Civil Protection coordination.



Transparent Uncertainty

Communicate scientific uncertainty honestly without implying "we can't know anything"—build trust through candor.

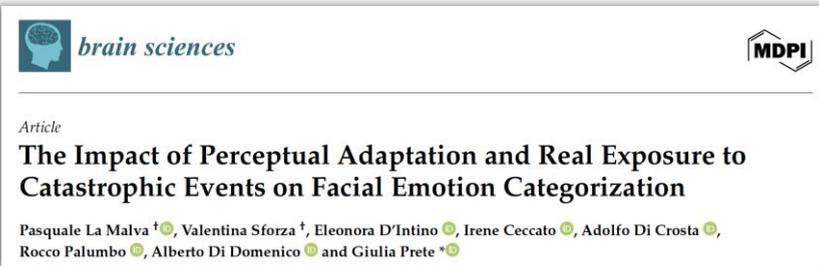
Core principle: Lower psychological distance + Higher self-efficacy = Sustainable behavior change without boomerang effects.

Study 2: Perceptual Adaptation and Emotional Pre-Alertness

Experimental Framework

Our second study investigated perceptual adaptation to emotionally intense disaster imagery and its effect on subsequent recognition of facial emotions.

Central finding: Brief exposure to emotionally salient disaster images "tunes" the perceptual system, accelerating recognition of negative emotional signals—essentially activating a state of pre-alertness.

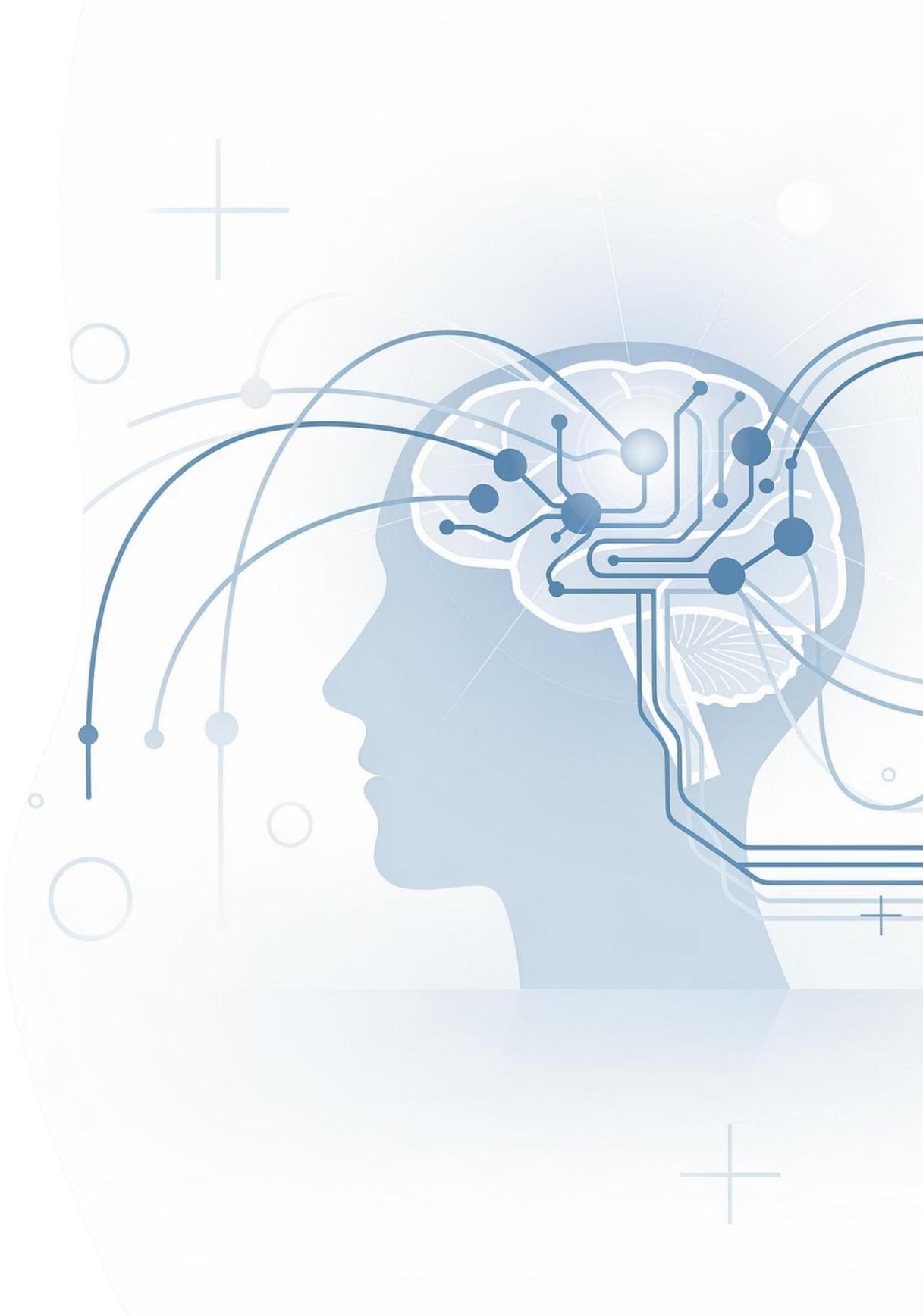
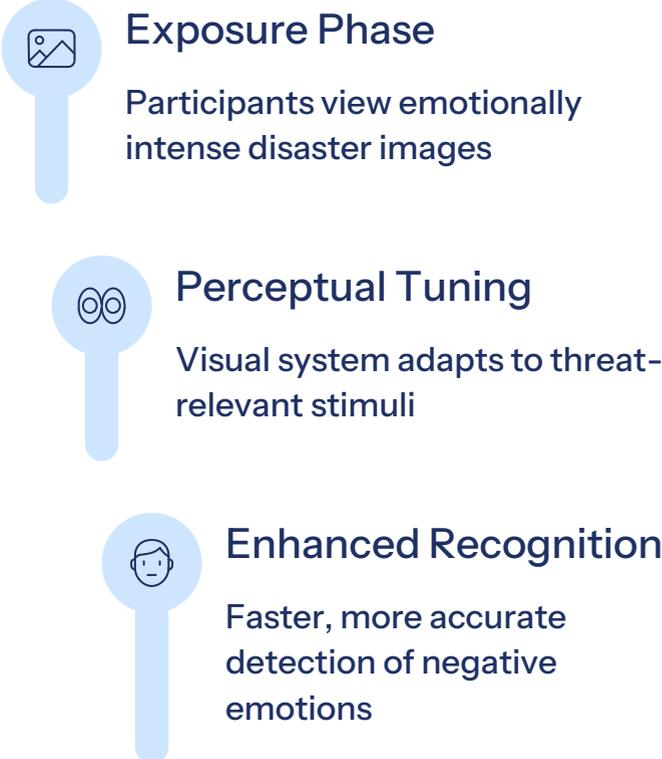


brain sciences MDPI

Article

The Impact of Perceptual Adaptation and Real Exposure to Catastrophic Events on Facial Emotion Categorization

Pasquale La Malva [†], Valentina Sforza [†], Eleonora D'Intino, Irene Ceccato, Adolfo Di Crosta, Rocco Palumbo, Alberto Di Domenico and Giulia Prete



❏ **Implications for DEFENSE:** Effective communication doesn't just prompt explicit actions—it can facilitate psychological adaptation processes including heightened attention, faster threat detection, and stronger predisposition toward protective behaviors. The key is calibration: enough salience to engage, not so much to overwhelm.

Our Contribution: Four Strategic Workstreams

We propose focused, high-impact psychological integration with realistic resource allocation but strategic positioning within DEFENSE.

1. Map Subjective Risk Landscapes

- Measure psychological distance dimensions
- Assess perceived vulnerability and control
- Evaluate source trust and behavioral intentions
- Enable targeted segmentation rather than one-size-fits-all messaging

2. Develop Communication Toolkit

- Evidence-based framing strategies
- Short, scalable message templates
- Action-oriented visualizations
- Integration with project outputs: interactive maps, scenario tools

3. Test Message Effectiveness

- Survey experiments with diverse populations
- A/B testing of different framings
- Measure comprehension, trust, efficacy, intentions
- Detect potential boomerang effects early

4. Produce Applicable Outputs

- Communication guidelines for citizens
- Recommendations for local authorities and schools
- Replicable, updatable materials
- Not just papers—practical stakeholder tools

Mission statement: Build an "earthquake-proof bridge" between scientific risk models and lived human experience—fostering adaptation and resilience without unintended psychological harm.

Moving Forward Together

3

Key messages

Earthquake risk,
psychological distance,
adaptive communication

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Types of Risk

Objective scientific
assessment meets
subjective human
perception

1

Shared Goal

Transform advanced
seismic science into
real-world resilience

Integrating technical-scientific components with psychological and communication dimensions isn't optional—it's the critical pathway from knowledge generation to societal impact. We look forward to this collaboration.

Thank you for your attention!

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