FRAMING MENTAL DISORDERS

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1. Project outline
2. The DSM-IV definition of delusions
3. A Frame analysis of delusions
4. Framing neuropsychological explanations of delusions
5. Conclusions
1. PROJECT OUTLINE

- Frame analysis of mental disorders
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  “… frames provide the fundamental representation of knowledge in human cognition” (Barsalou 1992, 21).

Two research directions:

1. Descriptive psychological thesis: mental representations are “cognitive” frames. Cognition represents and operates by means of frames and frame based mental simulations.

2. Methodological thesis: “explicit” frames should be used in order to represent explicitly the structure of our scientific knowledge, i.e. psychological, psychiatric, neuroscientific knowledge.
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- Frame analysis of mental disorders
  
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1. Descriptive psychological thesis: mental representations are “cognitive” frames. Cognition represents and operates by means of frames and frame based mental simulations.

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1. PROJECT OUTLINE

- Frame analysis of mental disorders

- What are frames? Barsalou (1992)
  - Recursive attribute-value structures
    - Superordinate category concepts are individuated by their relations to subordinate attribute concepts.
    - Values are subordinate concepts of attributes concepts.
  - Frames might represent further relations:
    - Structural invariants: systematic relations between attributes
    - Attribute constraints: systematic relations between attributes values
1. PROJECT OUTLINE

- Example of a frame for ‘vacation’ (Barsalou 1992)
1. PROJECT OUTLINE

- Frame as directed graphs (Petersen 2007)
1. **PROJECT OUTLINE**

- Frame as directed graphs (Petersen 2007)
1. Project Outline

- Frame analysis of mental disorders

- Complexity of clinical phenomena
  - Multiple cognitive, behavioral, neuropsychological, (…), dimensions of mental disorders.

- Heterogeneity of clinical phenomena
  - Disjunctive character of diagnosis criteria.

- Heterogeneity of classification criteria
  - Categorical and dimensional systems of classification.
1. **PROJECT OUTLINE**

- Frame analysis of the classification of mental disorders
- Complexity of clinical phenomena
- Heterogeneity of clinical phenomena
- Heterogeneity of classification criteria
- Focus on one key concept: ‘delusion’.
2. The DSM-IV Definition of Delusions

A delusion is “a false belief based on incorrect inference about external reality that is firmly sustained despite what almost everyone else believes and despite what constitutes incontrovertible and obvious proof or evidence to the contrary” (APA 2000: 821).
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Diagram:
- External world
- Belief
- False
- Firm
- No
- Incorrect
- Aboutness
- Prop. Att.
- Truth value
- Sustainment
- Sensitive to evidence
- Socially shared
- Inferential process.
2. The DSM-IV Definition of Delusions

- Delusions are *symptoms* of several mental disorders:
  - Schizophrenia
  - Schizophreniform disorders
  - Schizoaffective disorders
  - Alzheimer dementia
  - Mood disorders
  - Huntington’s disease
  - Parkinson’s disease
  - Multiple sclerosis
  - Traumatic brain injuries
  - Substance-induced disorders
  - Delusional disorders
  - ...
2. The DSM-IV Definition of Delusions

- Delusions are *symptoms* of several mental disorders
2. THE DSM-IV DEFINITION OF DELUSIONS

Delusions are classified depending on their content:

- “My closest relative has been replaced by an imposter” (Capgras delusion).
- “I am followed around by people who are known to me but who are unrecognizable because they are in disguise” (Fregoli delusion).
- “I am dead” (Cotard delusion).
- “The person I see in the mirror is not really me” (mirrored self-identification).
- “A person I knew who died is nevertheless in the hospital ward today” (reduplicative paramnesia).
- “This arm is not mine; it is yours. You have three arms” (somatoparaphrenia).
- “Someone else is able to control my actions” (delusion of alien control).
- “Someone else’s thoughts are being inserted into my mind” (delusion of thought insertion).
- But also persecution, grandiosity, jealousy, erotomania, etc.
2. The DSM-IV Definition of Delusions

- Delusions are classified according to their content.

Attribute constraint: [content $\rightarrow$ sub-type]

Diagram:
- Delusion
  - Aboutness
  - Content
  - Prop. Att.
  - Truth value
  - Sustainment
  - Socially shared
  - Sensitive to evidence
  - Inferential process
  - Symptom
- Incorrect
- False
- Firm
- No
2. THE DSM-IV DEFINITION OF DELUSIONS

Bizarre vs Non-Bizarre Delusions:

- “Delusions are deemed bizarre if they are clearly implausible and not understandable and do not derive from ordinary life experiences…”

- An example of a bizarre delusion is a person's belief that a stranger has removed his or her internal organs and has replaced them with someone else's organs without leaving any wounds or scars…

- An example of a non-bizarre delusion is a person's false belief that he or she is under surveillance by the police.

- … If the delusions are judged to be bizarre, only this single symptom is needed to satisfy Criterion A for Schizophrenia” (APA 2000, p. 299)
2. The DSM-IV Definition of Delusions

- Depending on content, delusions might be said “bizarre”, which impacts on the diagnosis.

![Diagram of delusion attributes and constraints]

- External world
- Content
- Firm
- False
- Belief
- Sub-type
- Bizarre
- Yes/No
- Attribute constraint [bizarreness → type of mental disorder]
- Incorrect
- Symptom
- Inferential process
- Socially shared
- Evidence
- Sensitive to
- Truth value
- Prop. Att.
- Sustainment
3. Frame Analysis of Delusions

- External world
- [...]
- Belief
- False
- Firm
- Yes/No
- Sub-type
- Bizarre
- Content
- Prop. Att.
- Truth value
- Sustainment
- socially shared
- Inferential process
- Sensitive to evidence
- Symptom
- Incorrect

Attribute constraint [bizarreness → type of mental disorder]
3. Frame Analysis of Delusions

- DSM-IV definition: theoretically inadequate elements

- [Diagram with nodes and arrows]:
  - External world
  - False
  - Firm
  - Yes/No
  - Incorrect
  - [...] (content)
  - Sub-type
  - Bizarre
  - Inference
  - Process
  - Sensitive to evidence
  - No
  - [...]
3. Frame Analysis of Delusions

- Delusions are contentful conceptual mental representations, that are insensitive to counter-evidence and thus immune to revision.
3. FRAME ANALYSIS OF DELUSIONS

- Delusions are contentful conceptual mental representations, that are insensitive to counter-evidence and thus immune to revision.

- Delusions have an asymmetric inferential profile: they might impact on the rest of the system of mental properties, whereas this does not hold the other way round.
Psychological definition: *delusions are contentful conceptual mental representations that have an asymmetrical inferential profile.*
Psychological definition: delusions are contentful conceptual mental representations that have an asymmetrical inferential profile.

Neuropsychological accounts aims to provide reductive explanations of theses features of delusions.

How to integrate neuropsychological reductive explanations?
According to the Two-Factor Account (TFA; Coltheart 2007, 2011), delusions occur as a result of the conjunction of two factors, which respectively explain:

a) Why delusions are tokened?

b) Why delusions are not rejected in reasons of their inconsistency with the other mental properties of the deluded patient?
4. Framing Neuropsychological Explanations of Delusions

Fact-A
Neuropsychological fact. generating an abnormal experience E.

Fact-B
Impairment in belief evaluation prevents the rejection of P.

Delusional explanatory belief
Abductive reasoning prompts an explanatory belief P.

Explanatory adequacy: if P was the case, then E would be expectable.
4. Framing Neuropsychological Explanations of Delusions

Fact-A: Neuropsychological fact. generating an abnormal experience E.

Fact-B: Impairment in belief evaluation prevents the rejection of P.

Delusional explanatory belief:

- Abductive reasoning prompts an explanatory belief P.
- Explanatory adequacy: if P was the case, then E would be expectable.

Capgras Delusion

- Reduced autonomic response to familiar faces.
- Right prefrontal impairment.
4. Framing Neuropsychological Explanations of Delusions

Abductive reasoning prompts an explanatory belief $P$.

Explanatory adequacy: if $P$ was the case, then $E$ would be expectable.

Fact-A: Neuropsychological fact. generating an abnormal experience $E$.

Fact-B: Impairment in belief evaluation prevents the rejection of $P$.

Fregoli Delusion: Enhanced autonomic response to faces.

Right prefrontal impairment.
4. FRAMING NEUROPSYCHOLOGICAL EXPLANATIONS OF DELUSIONS

TFA on several famous delusions:

<table>
<thead>
<tr>
<th>Delusion type</th>
<th>Factor A</th>
<th>Factor B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capgras</td>
<td>Reduced auto resp. to familiar faces</td>
<td>RPF Def.</td>
</tr>
<tr>
<td>Fregoli</td>
<td>Enhanced autonomic resp. to faces</td>
<td>RPF Def.</td>
</tr>
<tr>
<td>Cotard</td>
<td>Abolished autonomic responses</td>
<td>RPF Def.</td>
</tr>
<tr>
<td>MSMI</td>
<td>Mirror agnosia <em>or face agnosia</em></td>
<td>RPF Def.</td>
</tr>
<tr>
<td>Somatopara.</td>
<td>Paralysis of a limb</td>
<td>RPF Def.</td>
</tr>
<tr>
<td>Alien Control</td>
<td>Disrupted self-monitoring</td>
<td>RPF Def.</td>
</tr>
</tbody>
</table>

4. Framing Neuropsychological Explanations of Delusions

Psychological level

Cognitive level

[...] is red. explained by

A-Factor

is red. explained by

B-Factor

Asymmetrical

delusion

Content

Inferential profile
4. Framing Neuropsychological Explanations of Delusions

Psychological level

Cognitive level

Neurological level

Asymmetrical

Delusion

Content

Inferent. profile

A-Factor

B-Factor

[...]

is red. explained by

is red. explained by

is red. explained by

is red. explained by

?
4. Framing Neuropsychological Explanations of Delusions

- **Psychological level**: “My wife has been replaced”
  - Is red. explained by: Autonomic hypo-reactivity

- **Cognitive level**: Belief rev. sys. impaired
  - Is red. explained by: Right prefrontal imp.

- **Neurological level**: Abnormal STS connectivity
  - Is red. explained by: Right prefrontal imp.

- **Asymmetrical**: Capgras delusion
  - Inherent profile
  - Symptom

A Frame for the Capgras delusion
4. Framing Neuropsychological Explanations of Delusions

- **Psychological level**
  - Content: "I am surrounded by friends"
  - Asymmetrical
  - Right prefrontal imp.

- **Cognitive level**
  - Autonomic hyper-reactivity
  - Belief rev. sys. impaired

- **Neurological level**
  - Not yet known...

- A Frame for the Fregoli delusion
# 4. Framing Neuropsychological Explanations of Delusions

The variability of delusions might be represented by means of integrating *possible* values in a generalized frame for the concept of ‘delusion’.

<table>
<thead>
<tr>
<th>Psychological level</th>
<th>Cognitive level</th>
<th>Neurological level</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of possible values</td>
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</tr>
</tbody>
</table>

- **Psychological level**
  - List of possible values
  - Asymmetrical
    - Belief rev. sys. impaired
- **Cognitive level**
  - List of possible values
  - Right prefrontal imp.
  - is red. explained by
- **Neurological level**
  - List of possible values
  - is red. explained by

List of sub-types of delusions

List of possible values

List of possible values

Symptom

Inferent. profile
Attribute constraints enable to represent different (types of) dependencies between the values of the attributes.
4. **FRAMING NEUROPSYCHOLOGICAL EXPLANATIONS OF DELUSIONS**

- Example of attribute constraints:
  “if the value of central node is [capgras], then the value of the attribute [content] fall under the description [a close relative as been replaced]”.

- List of possible values
  - Asymmetrical
  - Belief rev. sys. impaired
  - Right prefrontal imp.
5. **Conclusive Remarks**

- The complexity and the heterogeneity of mental disorders impose to work on simple cases.
- Frames enable to represent accurately key concepts of psychiatry.
- Integrating possible values allows to represent the variability of psychiatric symptoms.
- Dependencies between values might be represented using attribute constraints.
Thank you for your attention!

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