

# There Will Be Consequence

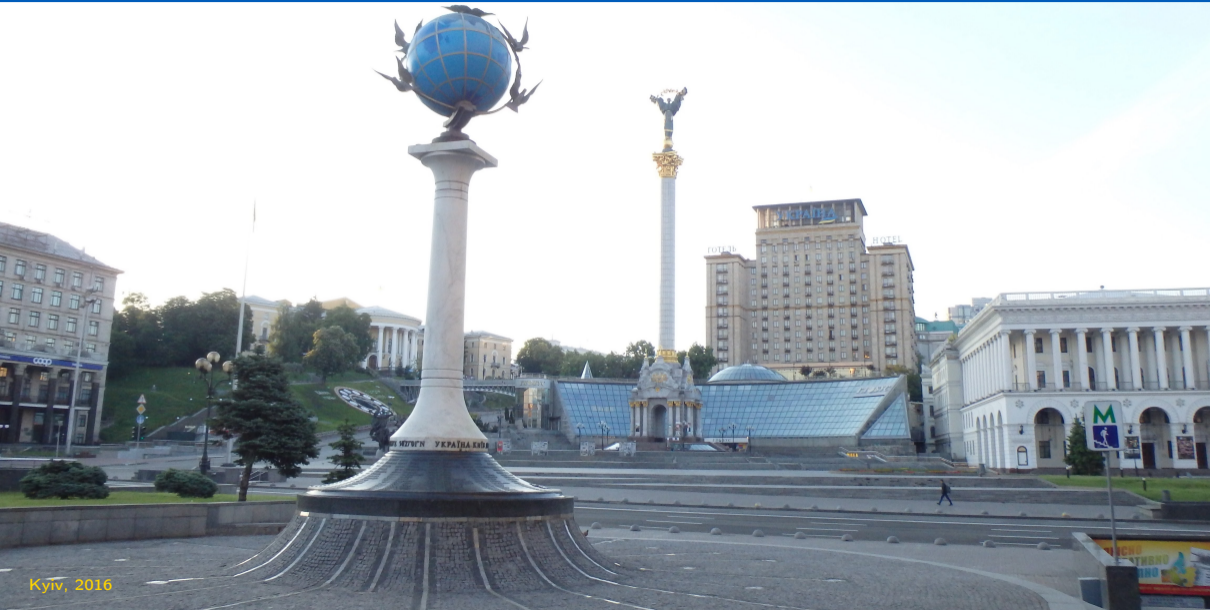
João Marcos

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**Logic4Peace**

April 2022

# On the social dimensions of logic & information



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When the very possibility of **reasoning** seems compromised:

Does Logic have relevant *social aspects*? What are they?

What kinds of warrants or support can an individual —or a group thereof— count on?

Can **trust** be reestablished?

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When we're drowning on **data**:

Can *misinformation* be countered? Can *disinformation* be stopped?

In view of generalised bias, bad faith and cognitive constraints,  
is it still **safe** to think of information as imbued with any sort of neutrality?

# On the social dimensions of logic & information

Didn't you forget about **language**?

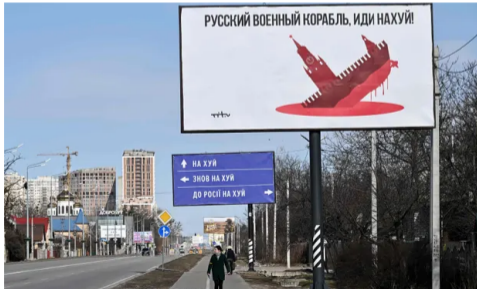
# On the social dimensions of logic & information

Didn't you forget about **language**? Well...

## How swearing became a weapon of resistance for Ukrainians

Their enthusiastic use of bad language contrasts with Putin's linguistic prissiness - and shows that Russia doesn't own Russian

### ● Russia-Ukraine war: latest updates



*The Guardian / April 13, 2022*



*Kyiv, May 2016*

## 'Don't mention the war' to be included in Dutch dictionary

Society [f](#) [t](#) [in](#) [r](#) January 24, 2022



DutchNews.nl / VanDale.nl

# Is 'the Truth' overestimated?



Lviv, May 2016



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The **True**, the **Good**, and the **Beautiful**:

*(Truth and Falsehood, H. Wansing & Y. Shramko, 2011)*

- value-theoretical tradition in German philosophy of the second half of the 19th century
- philosophical statements as *assessments*, rather than *judgments*, dealing with fundamental values
- the origin of the term 'Wahrheitswert'

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How do Theories of Truth help elucidating the **assertoric uses of language**?  
And what about *other essential uses of language*?

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Looking for *closure*:

## T-consequence: OPERATORS vs RELATIONS

A T-consequence **operator**  $\mathcal{C}$  on  $2^S$  must respect:

$$(CO_T0) \quad \mathcal{C}(\Gamma) \subseteq \mathcal{C}(\Gamma \cup \Delta)$$

$$(CO_T1) \quad \Gamma \subseteq \mathcal{C}(\Gamma)$$

$$(CO_T2) \quad \mathcal{C}(\mathcal{C}(\Gamma)) \subseteq \mathcal{C}(\Gamma)$$

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A T-consequence **relation**  $\triangleright$  on  $2^{\mathcal{S}} \times \mathcal{S}$  must respect:

(CR<sub>T</sub>0) if  $\Pi \triangleright A$ , then  $\Pi' \cup \Pi \triangleright A$

(CR<sub>T</sub>1) if  $A \in \Pi$ , then  $\Pi \triangleright A$

(CR<sub>T</sub>2) if  $\Delta \cup \Pi \triangleright A$  and  $\Pi \triangleright D$  for every  $D \in \Delta$ , then  $\Pi \triangleright A$



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Note 0: **Theories** are obtained as fixed points of consequence operators.

Note 1: Consequence relations may be induced by **proof systems** or by **logical matrices**.

Note 2: Every T-logic is **inferentially 2-valued**.

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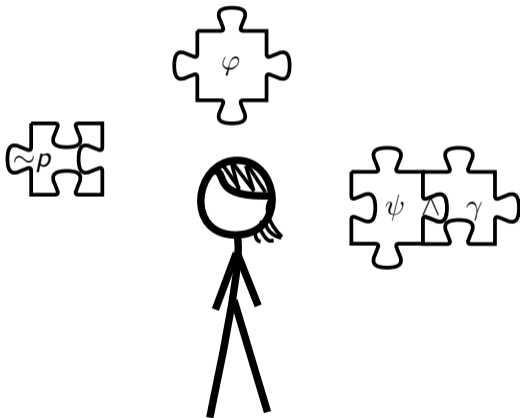
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**Assertions** vs **Opinions**

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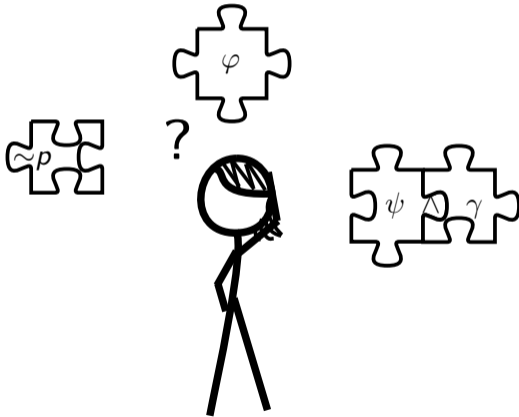
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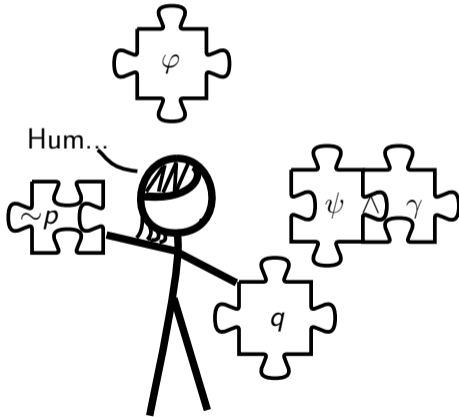
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**Knowledge** vs **Information**

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We propose that information does not originate with the agents...

...but that agents are entities who may entertain certain kinds of *cognitive attitudes* with respect to given pieces of information.

# Wanted: a more generous theory of judgments





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So, again, what is **Logic** about?



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Let's consider the following very general intuition:

A logic  $\mathcal{L}$  is concerned about the assignment and the propagation of a certain property  $\mathbf{P}$ . This property  $\mathbf{P}$  is shared by the objects belonging to the underlying logical theories of  $\mathcal{L}$ .

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Hummm... but what about the *Dark Side of the Moon*?



# Assertions vs Denials



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Primitive **judgments**: **Assertion** & **Denial**

**Sentences**: set  $\mathcal{S}$

**Consecutions**: pairs  $(\Delta_1, \Delta_0) \in 2^{\mathcal{S}} \times 2^{\mathcal{S}}$

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Principles that characterize a **judgment-compatibility relation**

“A fragment of a valid judgment-configuration is still a valid judgment-configuration.”

“Judgment gluts are disallowed.”

“Judgment gaps are disallowed.”

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## Principles that characterize a **judgment-compatibility relation**

A relation  $\triangleright$  on  $2^{\mathcal{S}} \times 2^{\mathcal{S}}$  satisfying, for every  $\Pi, \Pi', \Sigma, \Sigma', \Delta \subseteq \mathcal{S}$ :

“A fragment of a valid judgment-configuration is still a valid judgment-configuration.”

(CM0) if  $\Pi' \cup \Pi \triangleright \Sigma \cup \Sigma'$ , then  $\Pi \triangleright \Sigma$

“Judgment gluts are disallowed.”

(CM1) if  $\Pi \triangleright \Sigma$ , then  $\Pi \cap \Sigma = \emptyset$

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(CM2) if  $\Pi \triangleright \Sigma$ , then there is some  $\Delta' \subseteq \Delta$  such that  $\Delta' \cup \Pi \triangleright \Sigma \cup (\Delta \setminus \Delta')$



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## Principles that characterize a judgment-compatibility relation

A relation  $\blacktriangleright$  on  $2^{\mathcal{S}} \times 2^{\mathcal{S}}$  satisfying, for every  $\Pi, \Pi', \Sigma, \Sigma', \Delta \subseteq \mathcal{S}$ :

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Note 0: The complement of  $\blacktriangleright$  is an **S-consequence** relation. (a.k.a. ‘multiple-conclusion consequence’)

Its ‘single-conclusion counterpart’ is a T-consequence relation.

Note 1: More **logical values** are needed if (CM1) or (CM2) are abandoned.

Note 2: An appropriate novel notion of **theory-pair**,  
and associated **bilateralist consequence operators** are available.

# Acceptance vs Rejection

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23. Problemat Chajur 6. II. 926

Jeżeli funkcja ciągła  $f(x, y)$  w przedziale  $D \subseteq X, Y \subseteq \mathbb{R}$  oraz liczba  $\epsilon > 0$ ; czy  
istnieją liczby  $a_1, \dots, a_n, b_1, \dots, b_n, c_1, \dots, c_n$  o tej własności, że  $|f(x, y) -$   
 $f(a_k, b_k) - f(c_k, b_k)| \leq \epsilon$  w przedziale  $D \subseteq X, Y \subseteq \mathbb{R}$ ?

Odpowiedź: ~~nie~~ nie zawsze jest Chajur

Przykład: Działanie jest prawą przy założeniu dodatkowym, że funkcja  $f(x, y)$  po-  
dobna, ponieważ ciągła po obu stronach  $x$  lub  $y$ )

24. Problemat Chajur : 36

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Changing the game:

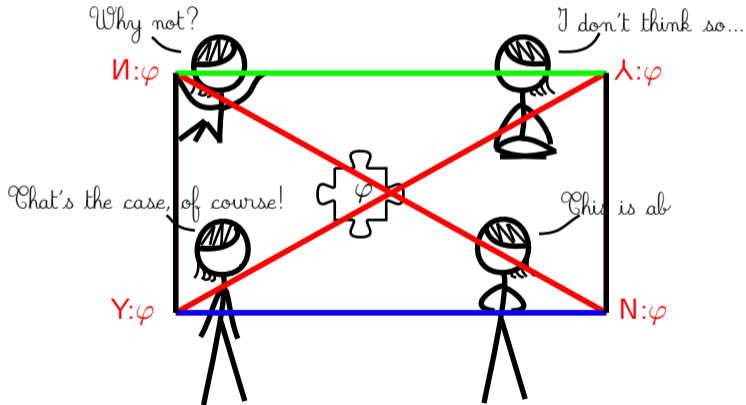
Consider the cognitive attitudes of **acceptance** and **rejection** as independent from each other.

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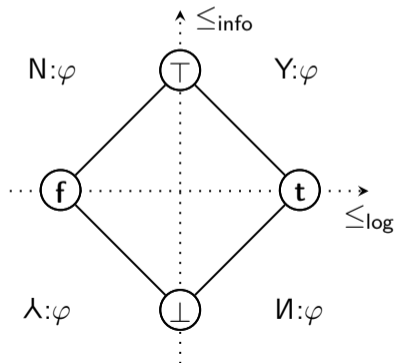
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Consider the cognitive attitudes of **acceptance** and **rejection** as independent from each other.

Notice that **truth-values** may be *recovered* from such an approach:



(focus on the *edges* rather than the *nodes*)

# A many-dimensional notion of (B-)consequence

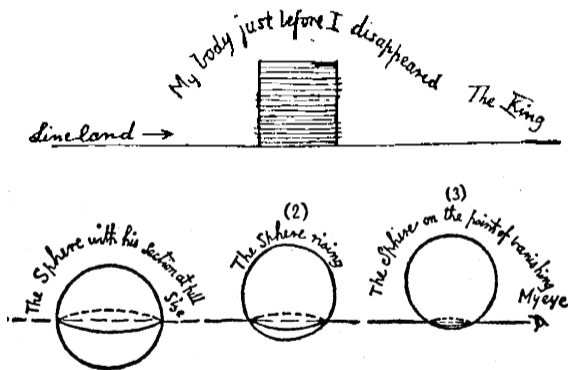


# A many-dimensional notion of (B-)consequence



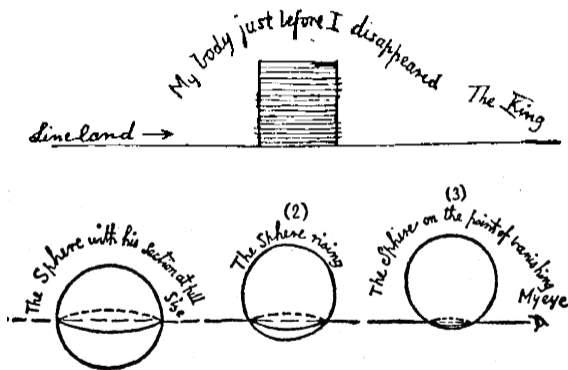
# A many-dimensional notion of (B-)consequence

Haven't we been living in *Lineland* for too long?



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Consequence, proof systems and entailment relations generalize rather *smoothly*.

# On collective decision-making

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A big challenge for any *society*:  
judgment aggregation.



Kyiv 2016

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Kyiv 2016

A shared goal:  
some sort of **consensus reaching**.





# Coda





Questions?  
Suggestions?





## Some references

- [link to this talk on YouTube](#)
- Guillermo Badia and João Marcos, “On classes of structures axiomatizable by universal d-Horn sentences and universal positive disjunctions”, *Algebra Universalis*, 79:41, 2018.
- Carolina Blasio, João Marcos, and Heinrich Wansing, “An inferentially many-valued two-dimensional notion of entailment”, *Bulletin of the Section of Logic*, 46(3/4):233–262, 2017.
- Carolina Blasio, Carlos Caleiro and João Marcos, “What is a logical theory? On theories containing assertions and denials”, *Synthese*, 198(22):5481–5504, 2021.
- Carlos Caleiro, Sérgio Marcelino, and João Marcos. “Combining fragments of classical logic: When are interaction principles needed?”, *Soft Computing*, 23(7):2213–2231, 2019.
- Vitor Greati, Sérgio Marcelino, and João Marcos, “Proof search on bilateralist judgments over non-deterministic semantics”, in *Proceedings of TABLEAUX 2021*, volume 12842 of LNCS, pages 129–146. Springer, 2021.