

Upgrading Functional Information

Giuseppe Primiero

FWO - Centre for Logic and Philosophy of Science, Ghent University



Giuseppe.Primiero@Ugent.be

<http://www.philosophy.ugent.be/giuseppprimiero/>

8th June, 2010 - Second IEG-GPI Marathon, Oxford

Outline

- 1 Functional Information
- 2 Decoupling and Gettierization
- 3 Data & Data Access
- 4 Distributed and Online Data

- 1** Functional Information
- 2 Decoupling and Gettierization
- 3 Data & Data Access
- 4 Distributed and Online Data

Semantic Information

Definition (Semantic Information)

Semantic information is *well-formed, meaningful and veridical* data.

- Semantic and alethically neutral data are insufficient conditions for information;
- False or meaningless data reduces at best to misinformation;
- Logic for being informed: a veridical but neither introspective nor reflective necessity operator

Two-sided Information

- **Factual/Semantic information:**
 - data working as constraining affordances;
 - typed at a certain LoA;
 - generate interface for access and processing;
- **DEF** and **NTA** for Upgrading to Knowledge assume a classical theory of truth for information;
- To preserve the **Veridicality Thesis (VT)**: a parallel and conceptually distinct notion of information is required.

Functional Information

- **Functional information** (See [Flo09]; [Pri10]) has an instructional role:
 - it expresses the conditional state of its factual counterpart;
 - it contains the instructions which, when executed, realize factual information;
- the non-veridical nature of information becomes admissible;
- works in a framework in which verification is conceptually prior to truth;
- needed for epistemic notions such as trust.

Functional Information (III)

A: "The use of a locker at the library requires a 5p coin".

B: "It is true that using a locker at the library requires a 5p coin".

C: "I am truly informed that the use of a locker at the library requires a 5p coin".

Functional Information (III)

A: "The use of a locker at the libray requires a 5p coin".

B: "It is true that using a locker at the libray requires a 5p coin".

C: "I am truly informed that the use of a locker at the libray requires a 5p coin".

A' : "The use of a locker at the libray requires a 5p coin".

B' : "Assume it is true that the use of a locker at the libray requires a 5p coin (as such assumption is admissible)".

C' : "I receive the information that the use of a locker at the libray requires a 5p coin".

Functional Information (III)

C': "I receive the information that the use a locker at the libray requires a 5p coin".



C: "I am truly informed that the use of a locker at the libray requires a 5p coin".

- 1 Functional Information
- 2 Decoupling and Gettierization**
- 3 Data & Data Access
- 4 Distributed and Online Data

The Decoupling Problem

Definition (Decoupling Test)

Explanans and *Explanandum* cannot be de-coupled without making the explanation incorrect.

- **NTA** survives the de-coupling test trivially (necessary condition)
- **NTA** survives Gettier-problems (sufficient condition)
- Does Gettierization apply when extending to functional information?

Gettierization

- Perspectivistic (contextual, not relativistic) account of justification;
Conditions Γ for any expression “Proposition A is true by verification”;
- To know A true means to satisfy each assumption in Γ (computationally: β -reductions to term constructors);

Definition (Contextual Verificationist Principle of Truth)

Truth is defined by the exhibition of a verification under the explicit satisfaction of its context of conditions.

Back to Decoupling

Definition (Functional Principle of Semantic Information)

Semantic Information is defined by the explicit satisfaction of its Functional Infons.

Definition (Informational Decoupling Test)

Functional Infons and *Semantic Infons* cannot be de-coupled without making the informational state incorrect.

- 1 Functional Information
- 2 Decoupling and Gettierization
- 3 **Data & Data Access**
- 4 Distributed and Online Data

Defining data for functional information

Definition (Functional Information)

Functional Information is procedural, structured, meaningful, non-reflective, collectively opaque data.

- Procedural: support verification/refutation;
- Structured: syntactically correct;
- Meaningful: admissible within correct typing;
Meaning is at a different LoA: evaluation under correct typing;
- Non-reflective: procedurally non-evaluated;

Collectively Opaque:?



Defining data for functional information (II)

- Contextual data means *state generated data*;
- Conditional for acquiring Semantic Information means *state directed data*;
- **State-based content**: opaque to external states;
- Upgrade to knowledge is acquisition of global transparency.

- 1 Functional Information
- 2 Decoupling and Gettierization
- 3 Data & Data Access



Data Accessibility

- *Limits* on the network: The network capability has to be no *greater* than the amount of valid information needed.

Definition (Data Accessibility Problem)

How is data accessed and where is such data still valid? Which accessible context turns a set of data into misinformation?

Data Accessibility (II)

Data accessibility over context extension is defined via introduction of epistemic modalities:

- $\Box_k(A \text{ true})$ iff for all $\Gamma_j \in \text{Context}$, $\emptyset \mid \Box_j \Gamma \vdash \Box_i(A \text{ true})$, where $j = \bigcup\{1, \dots, i-1\} \in \mathcal{G}$;
- $\Diamond_k(A \text{ true})$ iff for some $\Gamma_i, \Delta_j \in \text{Context}$, $\Box_i \Gamma \mid \Diamond_j \Delta \vdash \Diamond_k(A \text{ true})$, where $j = \bigcup\{1, \dots, k-1\} \in \mathcal{G}$;

Upgrade

The structure of the upgrade operation is a tripartite one:

- ① locally indexed data generate functional information;
- ② evaluation of local data turns it into semantic information;
- ③ evaluation under *any* extension of the relevant network turns semantic information into knowledge.

Offline Data

Definition (Offline data)

Data is in off-line status when it is not validly accessible by some admissible network source.

- Equivalent to satisfaction in some possible epistemic context;
- a point is possible that will break the network validity;
- This notion satisfies trivially functional information but also semantic information as collectively opaque data.

Online Data

Definition (Online data)

Data is in on-line status when is validly accessible by any admissible network source.

- Equivalent to satisfaction in a necessitated epistemic context;
- $\Box_i(A \text{ true})$ is derivable from $\emptyset \mid \Box_n \Gamma$ and hence $\Gamma_n \mid \Delta_n$ is admissible for any Δ ;
- Each context extension can simulate the process of accounting for one HC-question;
- This notion satisfies semantic information at all locations, hence as collectively transparent data.



Knowledge

- Upgrade: embedding data online data by verification and messaging among peers;
- Offline data is valid according to some privileged point in the network, but not to all peers;
- Epistemic data in a distributed network is functional/semantic information;
- Necessitated data is the result of upgrading from information to knowledge (i.e. the switch from distributed to common data);

References



L. Floridi.

Philosophical Conceptions of Information.

In G. Sommaruga, editor, *Formal Theories of Information*, volume 5363 of *Lectures Notes in Computer Science*, pages 13–53. Springer Verlag, 2009.



G. Primiero.

Review of G. Sommaruga (ed.), *Formal Theories of Information - From Shannon to Semantic Information Theory and General Concepts of Information*.

Minds & Machines, 2010.