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# CIRCULAR DEFINITION

The main aim of this paper is to construct a circular definition, which illustrates *The Revision Theory of Definition* (henceforth *RTD*). *RTD* was extensively presented in *The Revision Theory of Truth* (henceforth *RTT*) written by Anil Gupta and Nuel Belnap[1]. The concept of circular definition, given and logically justified in *RTD*, is useful for showing that some other concepts are also circular (e.g. truth, belief, rational choice). According to Gupta and Belnap, every kind of change of meaning of the predicate "true" (both ordinary and pathological, i.e. non-categorical) can be displayed by the use of circular definitions.

Let us analyse a constructed exemplification to get to know the process of revision and to understand how different parts (aspects) of the apparatus of revision work[2].

**Definition 1.1.**

Let $\mathfrak{L}$ $(= \langle L, M, \tau \rangle;\ M = \langle D, I \rangle)$ be an interpreted classical language with an ordered triple $\langle L, M, \tau \rangle$.

(i) $L$ is a language with the whole syntactic information (characteristic) of the language $\mathfrak{L}$.

(ii) $\mathfrak{L}$ has a model (structure) $M$, that gives the interpretation of non-logical constants, i.e. $M$ describes how denotation is assigned to predicates.

(iii) $\tau$ is a semantic scheme by which the interpretation of the logical constants is delivered.

[1] These authors teach in the Department of Philosophy at The University of Pittsburgh (USA). Professor Gupta was invited as a distinguished guest to a conference *Applications of Logic in Philosophy and Foundations of Mathematics* (Poland, Karpacz 2000), where he presented three lectures: *Definition, Truth and Rational Choice.*

[2] In my exemplification I use a typical, standard notation of mathematical logic and set theory. A certain notation (e.g. the notation of the rule of revision) is taken from *RTT* (see also Gupta 2001, pp. 102–103).

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(iv) $M$ is an ordered pair $\langle D, I\rangle$, which consists of a non-empty domain of discourse $D$, to which certain subsets $h$ belong.

(v) Subsets $h$ of a domain $D$ will be called *hypotheses* (e.g. objects $\mathbf{a}, \mathbf{b}, \mathbf{c}, \ldots$).

(vi) $X$ is the subset of $D$ (symbolically $X \subseteq D$) and $X$ is the set being a hypothetical initial extension of *definiendum* $G$.

(vii) Symbols $F, G, \ldots$ represent predicates; $x, y, \ldots$ are symbols of variables, representing names; $R$ represents a function (e.g., the function of being a parent).

(viii) The function (interpretation) $I$ assigns an element $D^n \to D$ to each $n$-ary function symbol, an element $D^n \to \{\mathbf{t}, \mathbf{f}\}$ to each $n$-ary predicate (where $\mathbf{t}$ is a symbol of a predicate "true", and $\mathbf{f}$ is a symbol of "false").

(ix) The interpretation (extension) $I$ of $F, G, \ldots$ is respectively represented by $I(F), I(G), \ldots$; $I(a), I(b), \ldots$ represent interpretations of names $a, b, \ldots$ (The interpretations of $a, b, \ldots$ are respectively objects $\mathbf{a}, \mathbf{b}, \ldots$).

**Definition 1.2.**

Let $L^+$ be the extended language (*syntactically* constructed) that is achieved by adding the *definienda* to $L$. Let $\mathfrak{L}^+$ be the extended language *semantically* constructed. Let $M + h$ be the model of a language $L^+$, which is the same as the model $M$, with an exception, that $M$ assigns an interpretation $h$ to a predicate $G$.

**Definition 1.3.**

Let $\mathfrak{D}$ be a set of definitions $d$ which introduces new predicates to $\mathfrak{L}$. $\mathfrak{D}$ contains definitions $d$ having the following scheme:

$$G(x_1, \ldots, x_n) =_{\mathrm{Df}} A(x_1, \ldots, x_n, G),$$

where $x_1, \ldots, x_n$ are variables, $A$ is a formula of $L^+$ having free variables $x_1, \ldots, x_n$.

**Definition 1.4.**

Let $\delta^n_{D,M}$ be a rule (i.e. scheme, function) of revision for $\mathfrak{D}$ in $M$ on the set $D \to \{\mathbf{t}, \mathbf{f}\}$ constructed by $D$, which meets the following condition:

$\delta^n_{D,M}(h)(d) = \mathbf{t} \longleftrightarrow d$ *satisfies* $A(x, G)$ in $M + h$,

$\delta^n_{D,M}(h)(d) = \mathbf{f} \longleftrightarrow \neg(d$ *satisfies* $A(x, G)$ in $M + h)$

**Definition 1.5.**

Let $\delta^n_{D,M}$ fix a stable (categorical) extension of *definiendum* by taking initially a hypothetical extension $X$ and assigning $X$ to $\delta^n_{D,M}(X)$.

This process can be displayed as follows:

$\delta^n_{D,M}(X) = X$,

$\delta^{n+1}_{D,M}(X) = \delta_{D,M}(\delta^n_{D,M}(X))$,

where $n$ stands for the number of the stage of revision:

$X^0 = \delta^0_{D,M}(X^0)$,

$X^1 = \delta^1_{D,M}(X^0) = \delta^1_{D,M}(\delta^0_{D,M}(X^0))$,

$X^2 = \delta^2_{D,M}(X^1) = \delta^1_{D,M}(\delta^1_{D,M}(X^0))$ etc.

**Example**

The definition (a) is a definition given in a natural language as follows:

(a) Someone (let us say) $x$ is *hereditarily intelligent*, means that $x$ is intelligent and if $x$ is a parent of someone else (let us say) $y$, then $y$ is *hereditarily intelligent*.

Symbolising (a) we obtain:

(a*) $x$ is $G =_{\mathrm{Df}}$ $x$ is $F$ and for every $y$ (if $xRy$, then $y$ is $G$),

where $G$ represents the name "hereditarily intelligent", $F$ represents the name "intelligent", $R$ stands for "... is a parent of ...".

Finally we get a symbolic form of (a*)

(a**) $G(x) =_{\mathrm{Df}} F(x) \wedge \forall y(xRy \rightarrow G(y))$.

It is obvious that (a**) is circular.

**Definition 1.6.**

Let $D = A \cup \{\mathbf{b}, \mathbf{c}, \mathbf{d}\}$ be the arbitrary domain of (a**). Let the following parameters be also arbitrary:

$A = \{\mathbf{a}_0, \mathbf{a}_1, \mathbf{a}_2, \ldots, \mathbf{a}_i, \ldots\}$;

$I(a_i) = \{\mathbf{a}_0\}$, $I(b) = \{\mathbf{b}\}$, $I(c) = \{\mathbf{c}\}$,

$I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$,

$I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, so

$I(R) = \{\langle \mathbf{b}, \mathbf{b}\rangle, \langle \mathbf{a}_0, \mathbf{a}_1\rangle, \langle \mathbf{a}_1, \mathbf{a}_2\rangle, \ldots, \langle \mathbf{a}_0, \mathbf{a}_2\rangle, \ldots, \langle \mathbf{a}_1, \mathbf{a}_2\rangle, \langle \mathbf{a}_1, \mathbf{a}_3\rangle, \ldots\}$.

We initially take a certain hypothetical value of $X$, e.g. $X = \emptyset$, it means $I(G) = \emptyset$ (i.e. no element has got a property $G$). Later we take another hypothetical value of $X$, e.g. $X = A$, which means that $I(G) = A$ (only elements of $A$ belong to the set, which is the hypothetical, initial extension of *definiendum* $G$). Later we take $X = \{\mathbf{b}\}$, etc. We check (a**) for a certain hypothetical value of $X$, for all supposed names – $a_i, b, c \ldots$ (and objects – $\mathbf{a}_i, \mathbf{b}, \mathbf{c} \ldots$), and for all stages of the revision.

**Theorem 1.1.**

If a hypothetical, initial extension of the *definiendum* $G$ (input) $I(G) = \emptyset$, then $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{c}\}$.

**Proof**

Let $X^0 = \emptyset$.

1) Initially, we check (a**) for $a_0$ and we get $F(a_0) \wedge \forall y(a_0 R y \rightarrow G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(a_0) = \mathbf{t}$.

Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, for $j > 0$ $a_0 R a_j = \mathbf{t}$. If $I(X) = \emptyset$, then $G(a_j) = \mathbf{f}$. So $\forall y(a_0 R a_j \rightarrow G(a_j)) = \mathbf{f}$. Since $F(a_0) = \mathbf{t}$, $F(a_0) \wedge \forall y(a_0 R a_j \rightarrow G(a_j)) = \mathbf{f}$. Thus $X^0 = \emptyset \rightarrow \mathbf{a}_0 \notin \delta^1_{D,M}(X^0)$.

2) Now, we check (a**) for $b$. So $F(b) \wedge \forall y(bRy \rightarrow G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, then $F(b) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $bRb = \mathbf{t}$. If $I(X) = \emptyset$, then $G(b) = \mathbf{f}$. So $\forall y(bRb \rightarrow G(b)) = \mathbf{f}$. Since $F(b) = \mathbf{t}$, $F(b) \wedge \forall y(bRb \rightarrow G(b)) = \mathbf{f}$. Thus $X^0 = \emptyset \rightarrow \mathbf{b} \notin \delta^1_{D,M}(X^0)$.

3) Now we check (a**) for $c$. We get $F(c) \wedge \forall y(cRy \rightarrow G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, then $F(c) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $cRc = \mathbf{f}$. If $I(X) = \emptyset$, then $G(c) = \mathbf{f}$. So $\forall y(cRc \rightarrow G(c)) = \mathbf{t}$. Since $F(c) = \mathbf{t}$, $F(c) \wedge \forall y(cRc \rightarrow G(c)) = \mathbf{t}$. Hence $X^0 = \emptyset \rightarrow \mathbf{c} \in \delta^1_{D,M}(X^0)$. Thus $X^0 = \emptyset \rightarrow \delta^1_{D,M}(X^0) = \{\mathbf{c}\}$. ■

**Theorem 1.2.**

If $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{c}\}$, then $X^2 = \delta^2_{D,M}(X^1) = \{\mathbf{c}\}$.

**Proof**

Let $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{c}\}$.

1) We check (a**) for $a_0$. So, $F(a_0) \wedge \forall y(a_0 R y \rightarrow G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(a_0) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, for $j > 0$ $a_1 R a_j = \mathbf{t}$. If $I(X) = \{\mathbf{c}\}$, then $G(a_j) = \mathbf{f}$. So $\forall y(a_0 R a_j \rightarrow G(a_j)) = \mathbf{f}$. Since $F(a_0) = \mathbf{t}$, $F(a_0) \wedge \forall y(a_0 R a_j \rightarrow G(a_j)) = \mathbf{f}$. Thus $X^1 = \{\mathbf{c}\} \rightarrow \mathbf{a}_0 \notin \delta^2_{D,M}(X^1)$.

2) We check (a**) for $b$. $F(b) \wedge \forall y(bRy \rightarrow G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(b) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $bRb = \mathbf{t}$. If $I(X) = \{\mathbf{c}\}$, then $G(b) = \mathbf{f}$. So $\forall y(bRb \rightarrow G(b)) = \mathbf{f}$. Since $F(b) = \mathbf{t}$, $F(b) \wedge \forall y(bRb \rightarrow G(b)) = \mathbf{f}$. Thus $X^1 = \{\mathbf{c}\} \rightarrow \mathbf{b} \notin \delta^2_{D,M}(X^1)$.

3) We check (a**) for $c$. So, $F(c) \wedge \forall y(cRy \rightarrow G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(c) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = a_j \wedge i < j\}$, $cRc = \mathbf{f}$. If $X^1 = \{\mathbf{c}\}$, then $G(c) = \mathbf{t}$. So $\forall y(cRc \rightarrow G(c)) = \mathbf{t}$.

Since $F(c) = \mathbf{t}$, $F(c) \wedge \forall y(cRc \to G(c)) = \mathbf{t}$. So $X^0 = \{\mathbf{c}\} \to \mathbf{c} \in \delta^2_{D,M}(X^1)$. Thus $X^1 = \{\mathbf{c}\} \to \delta^2_{D,M}(X^1) = \{\mathbf{c}\}$. ■

**Theorem 1.3.**
If $X^2 = \delta^2_{D,M}(X^1) = \{\mathbf{c}\}$, then $X^3 = \delta^3_{D,M}(X^2) = \{\mathbf{c}\}$.

The proof as above, etc., $\{\mathbf{c}\}$ is the fixed point.

**Theorem 2.1.**
If $I(G) = A = \{\mathbf{a}_0, \mathbf{a}_1, \mathbf{a}_2, \ldots, \mathbf{a}_i, \ldots\}$, then $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{a}_0, \mathbf{c}\}$.

**Proof**

Let $X^0 = A = \{\mathbf{a}_0, \mathbf{a}_1, \mathbf{a}_2, \ldots, \mathbf{a}_i, \ldots\}$.

1) We check (a**) for $a_0$. So, $F(a_0) \wedge \forall y(a_0Ry \to G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(a_0) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, for $j > 0$ $a_0Ra_j = \mathbf{t}$. If $I(X) = A$, then $G(a_j) = \mathbf{t}$. So $\forall y(a_0Ra_j \to G(a_j)) = \mathbf{t}$. Since $F(b) = \mathbf{t}$, $F(a_0) \wedge \forall y(a_0Ra_j \to G(a_j)) = \mathbf{t}$. Thus $X = A \to \mathbf{a}_0 \in \delta^1_{D,M}(X^0)$.

2) We check (a**) for $b$. So $F(b) \wedge \forall y(bRy \to G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(b) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $bRb = \mathbf{t}$. If $I(X) = A$, then $G(b) = \mathbf{f}$. So $\forall y(bRb \to G(b)) = \mathbf{f}$. Since $F(b) = \mathbf{t}$, $F(b) \wedge \forall y(bRb \to G(b)) = \mathbf{f}$. Thus $X = A \to \mathbf{b} \notin \delta^1_{D,M}(X^0)$.

3) We check (a**) for $c$. So $F(c) \wedge \forall y(cRy \to G(c))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(c) = \mathbf{t}$. Since If $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $cRy = \mathbf{f}$. If $I(X) = A$, then $G(c) = \mathbf{f}$. So $\forall y(cRy \to G(c)) = \mathbf{t}$. Since $F(c) = \mathbf{t}$, $F(c) \wedge \forall y(cRy \to G(c)) = \mathbf{t}$. So $X = A \to \mathbf{c} \in \delta^1_{D,M}(X^0)$. Thus $X^0 = A \to \delta^1_{D,M}(X^0) = \{\mathbf{a}_0, \mathbf{c}\}$. ■

**Theorem 2.2.**
If $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{a}_0, \mathbf{c}\}$, then $X^2 = \delta^2_{D,M}(X^1) = \{\mathbf{c}\}$.

The proof as above, etc., $\{\mathbf{c}\}$ is the fixed point.

**Theorem 2.3.**
If $X^2 = \delta^2_{D,M}(X^1) = \{\mathbf{c}\}$, then $X^3 = \delta^3_{D,M}(X^2) = \{\mathbf{c}\}$.

The proof as above, etc., $\{\mathbf{c}\}$ is the fixed point.

**Theorem 3.1.**
If $I(G) = X^0 = \{\mathbf{b}\}$, then $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{b}, \mathbf{c}\}$.

**Proof**

Let $X^0 = \{\mathbf{b}\}$.

1) We check (a**) for $a_0$. So $F(a_0) \wedge \forall y(a_0Ry \to G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(a_0) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, for $j > 0$ $a_0Ra_j = \mathbf{t}$. If $I(X) = \{\mathbf{b}\}$, then $G(a_j) = \mathbf{f}$. So $\forall y(a_0Ra_j \to G(a_j)) = \mathbf{f}$. Since $F(a_0) = \mathbf{t}$, $F(a_0) \wedge \forall y(a_0Ra_j \to G(a_j)) = \mathbf{f}$. Thus $X = \{\mathbf{b}\} \to \mathbf{a}_0 \notin \delta^1_{D,M}(X^0)$.

2) We check (a**) for $b$. So $F(b) \wedge \forall y(bRy \to G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(b) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $bRb = \mathbf{t}$. If $I(X) = \{\mathbf{b}\}$, then $G(b) = \mathbf{t}$. So $\forall y(bRb \to G(b)) = \mathbf{t}$. Since $F(b) = \mathbf{t}$, $F(b) \wedge \forall y(bRy \to G(y)) = \mathbf{t}$. Thus $X = \{\mathbf{b}\} \to \mathbf{b} \in \delta^1_{D,M}(X^0)$.

3) We check (a**) for $c$. So $F(c) \wedge \forall y(cRy \to G(y))$. Since $I(F) = \{\mathbf{a}_0, \mathbf{b}, \mathbf{c}\}$, $F(c) = \mathbf{t}$. Since $I(R) = \{\langle x, y\rangle : (x = y = \mathbf{b}) \vee (x = \mathbf{a}_i \wedge y = \mathbf{a}_j \wedge i < j\}$, $cRc = \mathbf{f}$. If $X = \{\mathbf{b}\}$, then $G(c) = \mathbf{f}$. So, $\forall y(cRc \to G(c)) = \mathbf{t}$. Since $F(c) = \mathbf{t}$, $F(c) \wedge \forall y(cRc \to G(c)) = \mathbf{t}$. So $X = \{\mathbf{b}\} \to \mathbf{c} \in \delta^1_{D,M}(X^0)$. Thus $X^0 = \{\mathbf{b}\} \to \delta^1_{D,M}(X^0) = \{\mathbf{b}, \mathbf{c}\}$. ■

**Theorem 3.2.**

If $X^1 = \delta^1_{D,M}(X^0) = \{\mathbf{b}, \mathbf{c}\}$, then $X^2 = \delta^2_{D,M}(X^1) = \{\mathbf{b}, \mathbf{c}\}$

The proof as above, etc., $\{\mathbf{b}, \mathbf{c}\}$ is the fixed point.

**Theorem 3.3.**

If $X^2 = \delta^2_{D,M}(X^1) = \{\mathbf{b}, \mathbf{c}\}$, then $X^3 = \delta^3_{D,M}(X^2) = \{\mathbf{b}, \mathbf{c}\}$

The proof as above, etc., $\{\mathbf{b}, \mathbf{c}\}$ is the fixed point.

So, finally there are two different fixed points $\{\mathbf{c}\}$, $\{\mathbf{b}, \mathbf{c}\}$.

A circular definition is understood as a scheme (rule, function) of revision $\delta_{D,M}$. The function $\delta_{D,M}$ takes an arbitrary hypothetical extension $X$ of the predicate $G$ as an initial argument (an input value), and assigns to this argument $X$ a unique value $\delta_{D,M}(X)$, i.e. a set, which is a new revised hypothetical extension of a predicate $G$, calculated on the basis of the given circular definition. The revision begins from e.g. $\emptyset$-hypothesis, taken as an initial hypothesis and can be repeated many times. The new revision at a still higher and higher level, is caused by following applications of a hypothetical rule of revision $\delta_{D,M}$. The process of revision consists in obtaining new succeeding hypotheses (i.e. candidates or versions) for the extension of the predicate $G$ appearing in a *definiendum* of a given circular definition. These new hypothetical extensions of $G$ are expected to be improved, or at least as good as an initial hypothesis (i.e. hypotheses, which repeat regularly, are counted as better ones). In following revisions some objects always belong to the set, which is an extension of $G$. These objects are positively stable for an initial hypothesis. But some objects finally do not belong to the extension $G$ in following revisions. These objects are negatively stable for an initial hypothesis. The result is unstable for other objects; in some cases they belong to the extension $G$, and in some cases they do not. Such objects are unstable. In the case of objects, which are positively or negatively stable, a circular definition gives a definitive result on the basis of the initial hypothesis, but it does not do this in the case of unstable objects. So, a circular definition is not able to fix an exact set as an extension of the predicate $G$. Nevertheless such a definition remains a scheme (rule), which is capable to calculate which set will be an extension of the *definiendum* $G$ if another fixed set is taken as an initial hypothesis. This is why the meaning, assigned by a circular definition to the *definiendum* $G$, is hypothetical (*RTT*, pp. 117–125; see Gupta 1981, pp. 735–736; Gupta 1982, pp. 1–60; Gupta 1988–89, pp. 234–237; Gupta, Belnap 1994, pp. 632–636; Gupta 1997, pp. 419–443; Gupta 2001, pp. 102–103; Belnap 1982, pp. 103–116; Koons 1994, pp. 614–615; Kublikowski 2005, pp. 143–156).

It is intriguing how an initial, hypothetical and an unstable extension of the *definiendum* $G$ changes into a stable, categorical extension in the process of revision. This transition is possible on the basis of the fact that *all possible* initial hypotheses of the extension of $G$, are taken into account in the revision process. If in the revision process for all possible hypotheses, a certain object always belongs to the extension of the *definiendum* $G$ then it is sure that this object is categorically $G$. The scheme of revision gives intuitionally correct categorical statements about ordinary, non-problematic (non-pathological) sentences, which always stabilise at the same value, independently of an initial hypothesis, which was taken in the revision process. Some other sentences stabilise for all hypotheses, but sometimes they stabilise as true and sometimes as false. The remaining sentences never stabilise in the revision process (i.e. they always change). We can say that the behaviour of different kinds of pathological sentences can be displayed in the revision process, in which analysed objects behave in a typical way, independently of an initial hypothesis (Gupta 1988–89, pp. 236, 242).

The application of the mathematical machinery of revision theory not only shows us how a circularity of definitions works, but this mathematical apparatus also allows us to obtain the same value (or values) for all possible, initial and arbitrary hypotheses of the extension of the *definiendum* $G$[3].

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