Esa Itkonen (University of Turku, Finland)

# CONCERNING THE ROLE OF IMAGINATION IN LINGUISTICS, PHILOSOPHY, AND LOGIC

Contents

1) Background

Theoretical linguistics has to come to grips, first of all, with the dichotomy between **observation** (= sense-perception) and **intuition**; and a further distinction has to be made between **intuition** (about intersubjective or socially valid norms) and **introspection** (of subjective contents of consciousness), qua subtypes of **non**-observation. Moreover, for use in action-explanations, we need to postulate **empathy** as a form of 'vicarious introspection'. Finally, theoretical **reflection**, regardless of whether it applies to results of observation, intuition, introspection, or empathy, must *ex definitione* be a subtype of non-observation.

Ever since the early 1970's, I have dealt with these fundamental notions in numerous publications (for a summary, see Itkonen 2013: 58-60). It is only recently that I became aware of the following defect in my overall account: there is no systematic place for the notion of **imagination**. To be sure, this notion recurs in many different guises but – to repeat – its existence has not been explicitly and systematically acknowledged.

The importance of imagination became obvious to me only after I came across claims that are supposed to show its **un**importance, for instance: "The methodology for determining semantic valence is **vulnerable**. The linguist **introspects** about **imagined** or conceptualized 'scenes' for verbs and who or what must be present or 'on the stage' with that verb" (Thompson & Hopper 2001: 41; emphasis added). "What has been discussed as 'valence' or 'argument structure' may be better captured … without trying to **imagine** scenes and participants" (p. 50; emphasis added).

As against Hopper & Thompson's 'data-oriented' position, I shall now argue that imagination, if properly understood, constitutes the basis for philosophical-*cum*-linguistic semantics as well as for logic (both formal and 'natural'). The all-important distinction between empirical and non-empirical sciences is determined by the absence vs. presence of **normativity** in the data (cf. Itkonen1978: 155-166, 2008: 292-295). But on another interpretation, it is determined by what can or cannot be (consistently) imagined.

2) Entailment as the Basis of Philosophical Semantics

Terminological note. Analytic = necessarily true; contradictory = necessarily false; synthetic/contingent = neither analytic nor contradictory; entailment = analytic implication (*if p, then q*).

"The concept of entailment (and the related concepts of logical contradiction and logical incompatibility) is the primary tool by means of which analytical philosophers undertake to analyze concepts" (Pap 1958: 92). For example: The classical definition of 'knowledge' as 'true justified belief', which goes back to Plato's *Meno* (97b-98a) and *Theaetetus* (201a-210d), can be interpreted as being elicited by entailments like (1)-(3):

(1) If X knows that p, then *p* is true
(2) If X correctly guesses that p, then X has a true belief concerning *p*, but X does not know that p.

(3) If X believes that p, when *p* is highly probable and yet false, then X has a justified belief concerning *p*, but X does not know that p.

(2) and (3), taken together, show that neither 'knowledge' = 'true belief' nor 'knowledge' = 'justified belief' is enough. What is required is 'knowledge' = 'true justified belief' (cf. Pap 1958: 285, Lehrer 1974: 14-18, Itkonen 1978: 302-304).

## 3) Imagination in Philosophical Semantics

Pap (1958: 371) makes a **twofold** claim: On the one hand, there are absolutely clear cases of entailment (= analyticity), as shown by (4); on the other, the analytic-synthetic distinction is a gradual one, as shown by the scale (4) < (5) < (6):

(4) If X is red, then X is coloured
(5) If X is a lemon, then X is sour
(6) If X is a lemon, then X is expensive

This is Pap's (1958) comment on (4): "There is nothing gradual about (4), because there is no **conceivable** situation in which one might be inclined to affirm the antecedent but to deny the consequent" (p. 371; emphasis added).

Next, this is his comment on (5): "I think that (5) is not analytic for most English-speaking people … -- in other words, that (5) is synthetic. But it is **conceivable** that we should invent a new class term for a new species of fruit, i.e. what looks like a lemon but does not taste sour, which would make (5) analytic, after all" (p. 345; emphasis added). Hence, (5) is analytic, if at all, only in a "gradual" (or "pragmatic") sense.

Finally, a sentence like (6) – not explicitly discussed by Pap (1958: 371) – is clearly synthetic, i.e. either true or false depending on the context. – Several things need to be noticed here.

(i) The key term *conceivable* is synonymous with *imaginable*. Hence, even the most demanding type of analytical philosophy, epitomized by Pap (1958), ultimately turns out to be based on imagination (because it is based on what is or is not conceivable). Let us add this explicit confirmation: "Once the relevant meaning of 'imaginable' is circumscribed by excluding the case where it is lack of experience … that limits the imagination, there is no objection to the imaginability criterion simply because there is no alternative to it" (p. 218). Wittgenstein (1958/1953) too endorses Pap's 'imaginability criterion': "Instead of 'imaginablity' one can also say here: representability by a particular method of representation" (p. 120, § 397).

(ii) In the present context, *imaginable* is in turn synonymous with *possible*. The basic **modal notions** of possibility and necessity are inter-definable: '*p* is necessarily true' = 'it is not possible (i.e. it is impossible) that *p* is false'; '*p* is possibly true' = 'it is not necessary that *p* is false'. As summarized by Pap (1958) on the very last page of this monumental work: "Faith in mutual understanding of basic modal notions is indeed an indispensable presupposition of all analytic philosophy" (p. 422). We now reach the same conclusion as in (i): all analytical philosophy is based on imagination. Why? Because 'it is possible

that p' = 'it **can** be imagined that **not**-p' whereas 'it is necessary that p' = 'it **cannot** be imagined that **not**-p'. (But notice that it can be imagined that p both if it is possible that p and if it is necessary that p.)

(iii) No conceptual analysis is feasible without the analytic-synthetic distinction, with the qualification, to be sure, that this distinction is a **gradual** one. Thus, there is a **continuum** extending from clearly analytic/necessary to clearly synthetic/contingent, with logical truths exemplifying the highest degree of analyticity/necessity: "As logical truths are necessary propositions, it cannot be validly inferred from the gradualistic character of analyticity that logical necessity is itself a matter of degree" (Pap 1958: 299). To repudiate the analytic-synthetic distinction just because of its gradual nature, is a banal misunderstanding, which e.g. Geeraerts & Cuyckens (2007: 146) succumb to: "Quine (1953) successfully argues that there is no tenable analytic-synthetic distinction." This misunderstanding in turn exemplifies the following more general fallacy: 'If there is no **absolute** distinction between A and B, there is **no** distinction between A and B'. The incidence of this fallacy in contemporary linguistics has been scrutinized at length in Itkonen (2016) and (2018). We should heed the following words of wisdom from Pap (1958): "Now, I have argued that the necessary-contingent distinction is vague, in the same sense that the bald-nonbald distinction is vague, …" (p. 376). "But to deny a distinction just because of its vagueness is of course a semantic naïveté of the first order. To say of the given distinction that it is vague is quite compatible with saying that there are cases to which one and only one side of the distinction clearly applies" (p. 401).

Here it is imperative to add the following metaphor from Wittgenstein (1980): "Wenn die Grenze zwischen zwei Ländern strittig wäre, würde daraus folgen, dass die Landesangehörigkeit **jedes** einzelnen Bewohners fraglich wäre" ? (§ 621; emphasis added). (The English translation is less transparent.) Vagueness about the distinction between A and B does not 'contaminate' the entire area covered by A & B.

(iv) On the one hand, entailments qua the basic tool of philosophical analysis are based on what can or cannot be imagined. On the other hand, "semantic analysis of natural language involves **intuitive** knowledge of necessary propositions [= entailments & contradictions]" (p. 396; original emphasis). Hence, intuition and imagination turn out to be (near-)synonymous in the present context. To be sure, philosophical analysis makes no headway unless intuition is 'enriched' by means of theoretical **reflection**: there has to be an 'ascent' from 'pre-theoretical' to 'theoretical' (with the understanding that the scope of intuition is enlarged during this process).

## 4) Imagination in Linguistic Semantics

Just like Pap (1958), Cruse (2000) too claims the 'analytic/necessary vs. synthetic/contingent' distinction to be gradual rather than absolute. More precisely, some *if – then* sentences are definitely entailments whereas others are less and less so. Consider these examples:

(7) If X stopped singing, X did not continue singing
(8) If X is a cat, then X is an animal
(9) If X is pregnant, then X is female

As for (7), "there is no **conceivable** world or universe in which the words mean what they mean in current English and the entailment does not hold" (p. 54; emphasis added). Hence, (7) is a **clear case** of entailment.

Next, (8) looks like another clear case, but by straining our imagination (*sic*), we do find a counter-example: "Suppose one day it was discovered that cats were not animals, as everyone had always thought, but highly sophisticated self-replicating robots" (*ibidem*). On this (rather extragavant) interpretation, (8) would indeed be false. This thought experiment is clearly analogous to the one connected with (5). (The entailment ceases to hold also if robot-like 'cats' are not taken to be cats.)

Finally, it is common knowledge today that (9) has ceased to be an entailment, due to actual (and not just imaginary) counter-examples. Incidentally, as much was implicitly predicted by von Wright (1971: 20): "the border between the two categories [= analytic vs. synthetic] has often fluctuated in the course of the historical development of a science…"

Let us add that Cruse (2000: 28-31) correctly characterizes entailment as a **logical** (rather than psychological) relation.

## 5) Semantic Imagination and Normativity

Let us reconsider Pap's (1958: 371) seemingly innocuous comment on (4): "There is no conceivable situation in which one might be inclined to affirm the antecedent but to deny the consequent." On at least one interpretation, this is patently false. We only need to imagine (*sic!*) a person X who is either a moron or an (at least self-styled) humorist. Then it is not only the case that X might be **inclined** to affirm the antecedent and deny the consequent, but X might actually **do** so as well.

Hence, some clarification is clearly called for. What Pap ought to have said, is that while it is perfectly possible to affirm the antecedent and to deny the consequent, it is **wrong** to do so. In one stroke, this reveals the **normative** basis of philosophical/linguistic semantics, which seems to have been taken for granted to the point of having (almost) come to be forgotten. – The normative basis of (language and) linguistics is discussed more generally e.g. in Itkonen (2008).

## 6) Imagination in Formal Logic

Imagination constitutes the core not just of (analytical) philosophy, but also of (formal) logic. Consider the following inference, known as 'Disjunctive Syllogism':

| (10) | p V q | p or q |
|---|---|---|
| | ~p | not-p |
| | q | q |

If, for instance, ~*q* is substituted for ~*p* in (10), the inference yields the conclusion *p*: "It must not be **imaginable** for **this** substitution in **this** expression to yield anything else. Or: I must declare it unimaginable. (The result of an experiment, however, can turn this way or that.)" (Wittgenstein 1967 [1956]: 82; original emphasis). Let us clarify: "Why are the Newtonian laws not axioms of mathematics? Because we could quite well **imagine** things being otherwise. … To say of a proposition 'This could be **imagined** otherwise' ascribes the role of an **empirical** proposition to it" (p. 114; emphasis added). Thus, the fundamental divide between empirical and non-empirical turns out to rest on what can or cannot be (consistently) imagined.

Still, an important caveat has to be added immediately. Up to now, we have been dealing with **voluntary** imagination, i.e. imagination recruited for the purposes of analysis. But **involuntary** imagination occurs as well, e.g. in dreams, and its results have nothing to do with the empirical vs. non-empirical distinction (cf. Sect. 13).

The reference to imagination entails no commitment to psychologism in logic and mathematics: "Certainly, the propositions 'Human beings believe that twice two is four' and 'Twice two is four' do not mean the same" (p. 226). There is a venerable tradition of **anti**-psychologism in the history of logic, starting with Pierre Abaelard, and continuing with Frege, and Husserl (once the latter had given up psychologism thanks to the former's influence). This topic will be taken up in Section 12 (cf. also Itkonen 2018: Sect. 8 and Subsect. 24-A).

## 7) Logical Imagination and Normativity

Wittgenstein's (1956/1967: 82) view in Sect. 6 on what can or must be imagined contains the same ambivalence as Pap's (1958: 371) in Sect. 5. If ~*q* is substituted for ~*p* in (10), it goes without saying that we **can** imagine the conclusion to be *q* (or anything whatever), and we can even write down the corresponding conclusion; but it would be **wrong** to do so. Upshot: All the time, we are dealing with **correct** (results of) imagination, rather than with imagination *tout court*. Elsewhere, of course, Wittgenstein says exactly the same thing: "A proof shows what **ought** to come out" (p. 90; original emphasis).

Let us add that while contradiction is the worst sin in formal logic, to be avoided at all costs, in a different (e.g. aesthetic) context it might be entirely rational to endorse contradiction (or at least to pretend to be doing so) (cf. Wittgenstein 1956/1967: 106). For instance, in order to illustrate irrationality, it is rational to (pretend to) endorse contradiction.

In sum: Imagination/intuition (enriched by theoretical reflection) is the principal method both in philosophy and in formal logic (as well as in linguistic semantics). But is this method not 'vulnerable'? Nonsense! As noted in 3)-(i), there simply is no alternative to it (cf. also Appendix 1). It is a different matter altogether that linguistic semantics may be **complemented** *ad libitum* by e.g. psychological considerations, as shown by the practice of 'cognitive' semantics, provided it has been correctly understood. But correct understanding is seriously obstructed by **all-out psychologism**, and therefore the Homeric struggle against this aberration has to go on, unabated (cf. Itkonen 2016, 2018.)

8) Believing to Be Able to Imagine X Does not Entail Being Able to Imagine X

What can or cannot imagined is not as straightforward as it may seem: ”You surely know what ’It is 5 o’clock here’ means; so you also know what ’It’s 5 o’clock on the sun’ means. It means simply that it is just the same time there as it is here when it is 5 o’clock” (Wittgenstein 1958: 111, § 350). In other words, we may think that we understand (= can imagine) something that, on reflection, we realize that we can**not**: ”For many mathematical proofs do lead us to say that we **cannot** imagine something which we believed we could imagine. … They lead us to revise what counts as the domain of the imaginable” (p. 141, § 517).

To keep things simple (e.g. to avoid unnecessary complications concerning the viability of time-measurements in different regions of the universe), Wittgenstein’s original pair of examples was replaced in Itkonen (1983: 120) by (11) vs. (12). To simplify things even more, these may in turn be replaced by (13) vs. (14):

(11) It is evening in London

(12) It is evening in the sun

(13) There is now a sunset in London

(14) There is now a sunset in the sun

It is surely impossible to **consistently imagine** the situation which makes (14) true. Now, the notion of ‘consistent imagination’ may be clarified as follows: “A moment’s reflection was said to be enough to show that ‘It is evening in the sun’ is meaningless. The decisive question is now what this kind of ‘reflection’ means. I think it would be correct to say that it means realizing what it would be like to **verify** the sentence in question. However, the term ‘verify’ is often used in a very narrow and concrete sense, and therefore, to obviate possible misunderstandings, I prefer the following formulation: realizing that ‘p’ is meaningful (or meaningless) means realizing that one is able (or unable) to tell a **coherent and acceptable story** about that which makes ‘p’ true” (Itkonen 1983: 120). In the sequel (= pp. 120-123) this definition is justified in more detail. (Compare Wittgenstein 1958 [1953]: 112, § 353: “Asking whether or how a proposition can be verified is only a particular way of asking ‘How d’you mean?’ The answer is a contribution to the grammar of the proposition.”) It is easy to extend this type of ‘verification-in-principle’ to questions and commands as well.

The basic weakness in Thompson & Hopper’s (2001) argument becomes apparent at the same time. Maybe imagination is a ’vulnerable’ methodology, but it is decidedly better than Thompson & Hopper’s **own** methodology. Why? Because their methodology is **nonexistent** (apart from just counting frequencies of occurrence in spoken discourse). If they have to show that they have indeed understood this or that meaning, they do not know what to say (apart from redundantly pointing at frequencies of occurrence). And do we need to recall Pap’s (1958) words about imaginability: “there is no alternative to it” (p. 218).

9) The Limits of Imagination

The precise contents of the word *imagination* depend on the context. In connection with (4), (7), and (10), this word seems to refer to something that is simply given. By contrast, a more **dynamic** interpretation is presupposed when imagination is called upon to invent a coherent and acceptable story (as distinguished from an incoherent and unacceptable one), as in connection with (11) vs. (12): this might be called **imagination in action**. To be sure, it was exemplified already in connection with (5) and (8).

In conducting his philosophical analysis, Wittgenstein is constantly and explicitly making use of imagination. (This will be further illustrated in Appendix 4.) Again and again, the **limits** of consistent imagination are explored by means of 'imagination in action'; for instance: "Orders are sometimes not obeyed. But what would it be like if no orders were **ever** obeyed? The concept 'order' would have lost its purpose" (p. 110, § 345). "One can imagine an animal angry, frightened, unhappy, happy, startled. But hopeful? And why not?" (p. 174). "Here is a **possibility**: I hear that someone is painting a picture 'Beethoven writing the ninth symphony'. I could easily **imagine** the kind of thing such a picture would show us. But suppose someone wanted to represent what Goethe would have looked like writing the ninth symphony? Here I could **imagine** nothing that would not be embarrassing and ridiculous" (p. 183; emphasis added; remember the synonymy between 'possible' and 'imaginable'). To summarize: "My aim is to teach you to pass from a piece of disguised nonsense to something that is patent nonsense" (p. 133, § 464).

In the light of what precedes, it might seem that Wittgenstein feels free, first, to imagine anything whatever and, then, to find out where this leads him. Still, it might be a good idea to check one's (imaginary) point of departure every now and then. Mundle (1970) expresses the following caveat: "Wittgenstein prescribes … that we should … confine ourselves to describing, assembling reminders about, everyday uses of language … But … [in his work] we find few remarks that appear to be reminders about everyday language, and they are usually false" (p. 128).

No doubt Wittgenstein's agenda is here conceived of too narrowly (which is largely due to his own misleading formulations). In any case, the following norm should be adhered to: In our flights of imagination, we are certainly free to go beyond everyday language and thinking. But **if** it is our deliberate purpose to describe everyday language, then we do **not** have the right to imagine that it is what it is not. In this sense, then, Mundle's iconoclastic criticism is welcome. This is also the (small) kernel of truth in Thompson & Hopper (2001).

Of course, Pap is bound to practice 'imagination in action' to exactly the same extent as Wittgenstein. In addition to (5), consider e.g. this: " 'Is it logically possible that a man should be entirely devoid of reasoning ability?' we ask in order to make clear to ourselves the meaning of 'man' …" (1958: 422). This question presupposes that there is no clear-cut, black-or-white answer, i.e. that we are dealing with a **gradual** distinction. But does this not contradict Pap's basic assumption about the fundamental role of (primarily) necessary / non-gradual **entailments** (cf. Sect. 3)? Not at all! How many times does it have to be repeated that 'gradual'/'relative' and 'non-gradual'/'absolute' are fully compatible, once they have been put into the proper perspective? Just consider this additional remark by Pap, on the very same page (which also happens to be the last page of his *magnum opus*): "To him who does not grasp the sense of 'possible' in which the existence of immortal men is possible yet the existence of round squares not possible, no analytic philosophy can be taught" (p. 422). Of course, the distinction between immortal men and round squares, as

conceived of by Pap, is an **absolute** one, -- hence similar to (4) and different from (5). It cannot be repeated often enough that what is (to be) imagined contains both absolute and gradual distinctions.

10) Belief and Imagination: Attitude/Act (= 'History') vs. Result (= 'Logic')

"Every belief must have both a history and a logic; for they are concerned each with a different element of the belief. 'Believe' is a psychological verb, and the history of a belief is therefore a psychological story; what is believed, a proposition, is a logical entity, having only logical properties and relations, which a non-temporal" (Edgley 1978/1965: 24).

One of the most important truths of psychology and linguistics, perhaps **the** most important one, is expressed in this passage with exceptional clarity; and I have had reason to quote it more than once in my publications. It was the basic insight of Itkonen (1983) that while human actions cannot be explained without recourse to **rationality**, the only way to understand rationality is to fully endorse its "Janus-like character" (cf. pp. 177-181), i.e. to endorse the dualism so beautifully expressed by Edgley (1978/1965).

To combine Edgley's and Popper's terminologies, the (psychological) history of a belief belongs to World-2 whereas its logic belongs to World-3. Entailments (= deductive relations) can hold only between beliefs qua 'inhabitants' of World-3. The same dualism is expressed by Davidson (1975):

"If someone is glad that, or notices that, or remembers that, the gun is loaded, then he must **believe** [= World-2] that the gun is loaded. Even to wonder whether the gun is loaded … requires [= **entails**] the **belief** [= World-3], for example, that a gun is a weapon, that it is a more or less enduring physical object, and so on. There are good reasons for not insisting on any particular list of beliefs [= World-3] that are needed if a creature is to wonder whether the gun is loaded [i.e. that are entailed by the belief that the gun may be loaded]. Nevertheless, it is **necessary** that there be endless **interlocking** beliefs" (pp. 7-8; emphasis added).

Much of the lack of clarity that prevails in the philosophy of linguistics and/or psychology results from an inclination to conceptualize all these facts within a single homogeneous (ultimately psychological) framework. Some of the attendant difficulties become apparent even in our Davidson-quotation. He claims that if someone is glad that the gun is loaded, then he **must** believe that the gun is loaded, that it is a physical object, and so on. But if this someone happens to be a complete madman, this is far from self-evident: "It is quite significant that idiots are not really considered to be 'subjects' " (Kroy 1976: 146); but notice the range of uncertainty expressed by "not really".

We must repeat, once again, that no absolute necessity exists in World-2. It exists only in World-3, with the consequence that 'must' becomes synonymous with 'ought' (as argued in Sections 5 and 7). In other words, this is what Davidson should have said: "If someone is glad that the gun is loaded, then – assuming s/he is a **rational** person – s/he must believe that …".

On the primary interpretation, what is true of *to believe* is true of *to imagine* as well. The intersubjective World-3 character of what is believed or imagined is evident from the following chain of definitions: to know the meaning of *p* = to verify *p* = to tell a coherent and (generally) **acceptable** story about *p* (cf. Sect. 8). This interpretation will be further confirmed in Section 11. The secondary interpretation, which assumes the existence of entirely subjective (World-2) imagination, will be discussed in Section 12.

11) “The Common-Sense Theory of Imagination” of Kroy (1976)

It was argued above that, on one interpretation, formal logic is ultimately based on imagination. A strong defence of this thesis, taken *à la lettre*, has been given by Kroy (1976). In epistemic logic, the possible-worlds semantics has been massively used to describe such propositional attitudes and mental acts as belief, knowledge, perception, remembering, etc. Kroy (1976) goes one step farther. His general argument contains the following stages:

(i) “The possible-worlds semantics … will be interpreted by making ‘possible worlds’ psychological constructs” (p. 10). “The formal rules defining ‘possible worlds’ … can be reinterpreted as rules which the imagination applies in constructing possible worlds” (p. 11). “We will transform modal logic from a mathematical discipline into an empirical theory of mental functioning. … This theory is empirical in the same way a theory of linguistic competence, i.e. a grammar, is” (p. 99).

(ii) “We intend to extract, on reflecting on these usages [i.e. those of words like *imagination*, *to imagine*, and *imaginable*] … the commonsense theory of imagination” (p. 101). “Fiction is a rather large constituent of our culture. … How did the writer (author, story teller) know to write this **story** in this particular manner? He … did not perceive those things happening. He ‘imagined’ them. They are ‘products of his imagination’ “ (pp. 103-104; emphasis added).

(iii) “Whatever the imagination of the story-teller can produce, the imagination of any of his ‘clients’ can reproduce. … Stories are sequences of **propositions**. If we need imagination to understand them, why is it not imagination which is required to understand each of these propositions separately?” (p. 106; emphasis added). “The imagination … produces representations of possible worlds in which the propositions in question are true” (p. 108).

(iv) “To understand a proposition is to imagine a situation in which this proposition is true. What, however, about **argumentation**? … Validity of the argument is precisely that: the truth of its premises guarantees the truth of its conclusion in all ‘possible worlds’. Thus evaluations of validity of arguments depend on the imagination, since stories are essentially involved. The definition of validity in terms of ‘all possible worlds’ is intimately connected with ‘all situations we could possibly imagine’. This connection is closely related with the recurrent identification of logically false statements as ‘inconceivable’ or ‘unimaginable’ ….” (pp. 112-113).

(v) Next, the results achieved in connection with story-telling, proposition understanding, and validity checking are extended to **phantasies** and **plans** (pp. 115-122). On the whole, this turns out to be an ambitious agenda for the **human sciences**, given that, in the prototypical case, to perform an **action** presupposes **planning** why and how to act; and it is precisely to capacity to act which distinguishes human beings from physical things.

(vi) Finally, the “empirical” (or “phenomenological”) adequacy of this theory of imagination is meant to be confirmed by a set of “introspective experiments”, where test persons have to answer the following questions (pp. 138-154):

“Can you imagine A?”

“Can you imagine B without imagining C?”

“If you imagine D, can you also extend the imagined situation to include E?”

12) Comments on Kroy (1976)

It goes without saying that, *prima facie*, Kroy (1976) validates the thesis of the preceding sections, summarized as the identity of 'possible (worlds)' with 'imaginable (worlds)'. Still, it is just too simple to take modal (possible-worlds) logic and to 'reinterpret' it, *telle quelle*, as an empirical psychological theory. There are well-known arguments against this type of straightforward psychologism, well summarized by Bergman (1957):

"Our minds are not so constituted that when we grasp what a sentence or a group of sentences [= premises] says we also know what they imply [= conclusion]. To know that, we must 'reason' deductively. … Take Euclidian geometry, with which we are all familiar. Its axioms are few and simple; we all know them after a fashion. Its theorems are many, some very complicated. Yet all theorems, those already 'discovered' as well as those nobody has yet thought of, are deductive consequences of the axioms" (pp. 30-31). Upshot: deductive reasoning cannot just **result** from our psychological constitution if the former must be achieved by **overcoming** (and hence, in a sense, **denying**) the latter (cf. Appendix 7).

Now, Kroy is sophisticated enough to reject the traditional version of psychologism: "No past arguments (such as Husserl's [1913]) are at all relevant to this version of psychologism which we maintain, simply because we do not claim that logic is valid for psychological reasons" (p. 114). But it remains unclear how to reinterpret deductive logic "not valid for psychological reasons" as an "empirical theory of mental [= psychological] functioning" (cf. above).

To be sure, Kroy is not totally without assistance: "The modern impetus for mentalism was first given in the works of Chomsky … (p. 100). "The formal theory of the imagination presented thus far is methodologically analogous to a Chomskyan grammar" (p. 131). Kroy is perfectly right about this analogy, but, on reflection, it only strengthens my point. Why? Because Chomsky-type 'mentalism' imitates deductive (= axiomatic) logic and is incompatible with genuine psychology:

"The [Chomskyan] 'ideal speaker' possesses no properties over and above those belonging to an axiomatic system; in fact, **the two are identical**" (Itkonen 1976: 214; original emphasis). "It is obvious that transformational grammar, with its unrealistic notion of competence, is not a psychologically real theory: the competence of the 'ideal speaker' is a 'mental grammar' but – as we just saw – this grammar is an imitation of axiomatic systems, which have been constructed for the description of **artificial** languages" (p. 215; original emphasis).

In sum, Kroy's (1976) overall argument proves to be less than successful: "I do not wish to deny that there is some ingenuity in his attempt to combine two dissimilar and partly defective traditions [i.e. mentalism vs. modal logic] into one non-defective whole. Yet it is by now easy to see that this strategy cannot work, simply because the research interests of the logician and those of the psychologist are two different. In fact, Johnson-Laird (1982: 33) convincingly argues for the psychological **non**-reality of possible-worlds semantics" (Itkonen 1983: 305). On the other hand, as indicated above, Kroy (1976) seems to achieve the more limited goal of formulating a "common-sense theory of imagination", or at least an important fragment of such a theory.

13) To Believe, to Imagine, to Dream

The analogy between believing and imagining has been emphasized here, insofar as the 'attitude/act vs. result' dualism is concerned. On the other hand, there are obvious disanalogies as well. First, believing is always involuntary whereas (as we have seen) imagining is often voluntary: in the 'introspective experiments' of Kroy (1976), in particular, test persons are confronted with the **task** of finding out what they can or cannot imagine. Second, the question of truth vs. falsity is all-important with respect to beliefs but largely irrelevant with respect to what is imagined. Now, the nature of **dreams** is apt to throw additional light on this issue.

This is how Kneale (1970) describes what she calls "the traditional account of dreaming": "When we dream we are in sleep accepting as **true** certain **propositions** which are, for the most part, **false**. These are expressed in, or accompanied by, **imagery** of various sorts and they may also occasion emotions. The contents of **beliefs** … are false but the believing or imagining are themselves real and so are the emotions they arouse" (p. 238; emphasis added).

This scenario emphasizes the similarity between being awake and dreaming, and it has always been used, by Socrates among others, to plead for scepticism. This is the argument in outline:

(i) When I am dreaming, I (erroneously) think I am awake. Therefore, although I now think I am awake, perhaps I am dreaming.

(ii) Most of what I believe when I am dreaming is false. Therefore, most of what I now believe is perhaps false (because I may be dreaming).

Kneale (1970: 238-241) points out that this traditional argument is fallacious insofar as, by simplifying the nature of dreams, it comes to exaggerate the similarity between being awake and dreaming: "all dreaming is believing". Instead, Kneale (p. 243) suggests another option: "Do we believe when we dream or do we merely imagine?" (given that "in imagining we do not believe the propositions we entertain"). Her "unexciting" answer is 'both – and'; but in any case it departs from the traditional view.

From my point of view, the important thing is the overlapping tripartite taxonomy 'believing – imagining – dreaming', where the last two members are prime examples of **non**-observation.

14) Imagination Vindicates the Primacy of 'Non-Experientialist' Semantics

"Reason, in the West, has long been assumed to be disembodied and abstract – distinct … from the mechanisms of **imagination** …. In this century, reason has been understood … as roughly fitting the model of formal **deductive logic**" (Lakoff 1987: 7; emphasis added). As Lakoff (1987) sees it, such a notion of reason is characteristic of so-called Objectivism, exemplified both by Greek philosophy and by 20th-century (Pap-type) analytical philosophy; and, as recommended by him, Objectivism ought to be replaced by ('imagination'-based) Experientialism.

The preceding discussion shows Lakoff to be mistaken. According to unquestionable authorities like Pap and Wittgenstein, both analytical philosophy and deductive logic are based on **imagination**, taken in its **primary** meaning. Lakoff's attempts at usurping this word are self-serving and therefore unconvincing. Whatever secondary ('Lakoff-type') meanings may be assigned to *imagination* is of no significance (at least in the present context).

Let us make this a little more precise. By offering an inordinately narrow definition of 'imagination', Lakoff (1987) makes it look like imagination was always considered as either nonexistent or "mere fancy", until he and Mark Johnson finally arrived on the scene (cf. Itkonen 2018: Subsect. 24-A, Subsect. 26-A):

"[The models proposed by others] do not include any of the 'imaginative' models – metonymic, metaphoric, and image schematic" (p. 117).

"… products of the imagination such as metaphor, metonymy, and mental imagery … are banned from the realm of true concepts" (p. 165). "… such imaginative aspects of human psychology as metaphor, metonymy, and mental imagery …" (*ibidem*).

"…; mental images, which can differ from person to person; and imagination – especially metaphor and metonymy …" (p. 183).

"… imaginative devices, i.e. metaphor, metonymy, or mental imagery " (p. 285).

"… concepts … which are a result of the human imaginative capacity: cognitive models involving metaphor and metonymy, …" (p. 309).

"… imaginative aspects of cognition such as metaphor and metonymy" (p. 341).

"Reason is imaginative in the sense that it makes use of metonymies, metaphors, and a wide variety of image schemas, … **Imagination is not mere fancy**, …" (p. 368; emphasis added).

"… imaginative processes (metaphor, metonymy, mental imagery) …(p. 371).

It would be much too easy to multiply these quotations, which is why I refuse to do so. Incidentally, is there any truth in the view that the importance of metaphor remained totally unrecognized, until Lakoff and Johnson came along? No, not a shred. Let just have a quick look at what William Dwight Whitney, the leading American linguist of his time, had to say about this topic in 1875, i.e. more that 100 years before the advent of the 'Cognitivist Revolution':

"A conspicuous branch of the department of figurative transfer, and one of **indispensable importance** in the history of language, is the application of terms having a physical, sensible meaning, to the designation of intellectual and moral conceptions and their relations. It is almost useless to attempt to illustrate this; the examples would come crowding in too numerously to be dealt with; … In fact our **whole** mental and moral vocabulary has been gained precisely in this way; the etymologist feels that he has not finished tracing out the history of any one of its terms until he has hunted it back to the **physical** conception in which, by the general **analogies** of language, it must have had its **origin**. … [T]here is **no grander phenomenon** than this in all language-history" (1979/1875: 88-90; emphasis added).

Once again, this is Lakoff (1987): "Comprehending experience via metaphor is one of the great imaginative triumphs of the human mind" (p. 303). Does this sound familiar? Of course it does. If we didn't know better, we might think that it has been copied from Whitney (1979/1875).

15) Conclusion

According to some of us, the notion of **mental image** plays a central role in linguistic semantics, while according to others, it plays no role at all. This intriguing topic is investigated at some length in Itkonen (2018: Sections 13-15 and Appendix 1). Therefore, it has been mentioned here only in passing. Also, much remains to be said (or has already been said elsewhere) concerning such subtypes of imagination as **empathy** in constructing rational explanations, **speculation** in capturing good (as opposed to bad) analogies, and so on.

Appendix 1: A Note on Gradualness

Why is it that some people experience huge difficulties in coming to grips with the notion of **continuum**? Among many possible answers, I single out here the following one. On the one hand, a distinction like 'young vs. old' or 'analytic vs. synthetic' is a **relative** (or gradual) one, in the sense that there is no cut-off point where 'young'/'analytic' ends and 'old'/'synthetic' begins. On the other hand, the two extremes of each such distinction are **absolutely** different. (This is the gist of the quotations from Pap and Wittgenstein that were given in Sect. 3, Paragraph (iii).) Now, to a casual observer this may look like a contradiction: How can anything be both relative and absolute? The answer is, of course, that there is no contradiction because 'relative' and 'absolute' are **not** predicated here of one and the same thing.

Let us conceptualize the situation as follows: First, consider the entire area covered by A > B > C > D > E > F > G > H (where additional letters can be thought to be added *ad libitum* between any two adjacent letters): the distinction between A > … > H is a **relative** one. Second, delete all letters except A and H: Now, as if by miracle, what was relative just a moment ago has totally disappeared! Now we have the **absolute** distinction between A and H.

I know that there are those who will find this illustration contrived, artificial, difficult to follow, overwhelming, etc. But until I can think of a better one, this is what we have to be satisfied with. In the meantime, let us see what (if anything) we can learn from Aristotle.

Appendix 2: Aristotle on Gradualness

"There are not many differences in mental habit more significant than that between the habit of thinking in discrete, well-defined class-concepts and that of thinking in terms of continuity, of infinitely delicate shadings-off of everything into something else, …" (Lovejoy 1936: 57).

Against this background, let us have a very compressed account of what Aristotle regarded as the 'first principles' of his **physics** (and not, as one might think, of his **meta**physics). As he sees it, physics is primarily about motion/change, which is defined in terms of either contraries (= 'white vs. black') or contradictories (= 'white vs. not-white'):

"First principles must not be derived from one another nor from anything else, while everything must be derived from them. But these conditions are fulfilled by the primary contraries, … For

how could 'white' *come from* 'musical', unless 'musical' happened to be an attribute of the not-white or of the black? No, 'white' comes from 'not-white' – and not from **any** 'not-white', but from black or some intermediate colour. Similarly, 'musical' *comes* to be *from* 'not-musical', but not from **any** thing other than musical, but from 'unmusical' or any intermediate state there may be. Nor again do things *pass into* the first chance thing; 'white' does not *pass into* 'musical' …and not into any chance thing which is not white, but into black or an intermediate colour; … Even things which are not simple but complex follow the same principle, … If then this is true, everything that comes to be or passes away comes from, or passes into, its contrary or an intermediate state" (*Physics*: 188a,25 – 188b,20; italics added).

"An intermediate may be the starting-point of change, since for the purposes of the change it serves as contrary to either of two contraries: … for instance, grey is light relative to black and dark relative to white" (224b,30).

"**Change** within the same kind from a lesser to a greater or from a greater to a lesser degree … is **motion** either from a contrary or to a contrary" (226b,1-5; emphasis added).

"Now every **change** implies a pair of opposites, and opposites may be either contraries or contradictories; since then contradiction admits of no mean term, it is obvious that 'between' must imply a pair of contraries" (227a,30; emphasis added).

"Now **motions** respectively **from** a contrary and **to** the opposite contrary, e.g. a motion from health and a motion to disease, are not contrary motions: for they are one and the same" (292a,15; emphasis added).

In sum, any continuum can **recursively** be made more and more dense in the following way: First, there is a coarse continuum A < B < C with the extremes (= contraries) A and C and the intermediate state B. Next, B is redefined both as the new contrary to A, with some D assuming the role of the intermediate state (between A and B), and as the new contrary to C, with some E assuming the role of the intermediate state (between C and B). Next, D and E are redefined as the new contraries to A and C, respectively; and so on.

"[Aristotle] is oftenest regarded, I suppose, as the great representative of a logic which rests upon the assumption of the possibility of clear divisions and rigorous classification. … But this is only half the story about Aristotle; and it is questionable whether it is the more important half. For it is equally true that he first suggested the limitations and the dangers of classification, and the non-conformity of nature to those sharp divisions which are so indispensable for **language** and so convenient for our ordinary mental operations" (Lovejoy 1936: 57-58; emphasis added).

I welcome the opportunity to repeat my earlier comment on this passage by Lovejoy: "In linguistic writings of cognitivist and/or functionalist orientation, it has become customary to picture Aristotle as the arch-foe of 'family resemblances' and 'prototypes'. Now we see that this picture is false. It is a curious fact that those who most vociferously claim to have renounced any type of black-and-white thinking apply precisely this type of thinking to how they write history (and to much else, besides)" (Itkonen 2005: 225-226).

Given his equation 'change = motion', Aristotle turns out to be perhaps the most enthusiastic proponent of **fictive motion**, a notion much studied in recent cognitive linguistics.

Appendix 3: A Note on Pap's (1958) Agenda

On more than 400 pages, Pap (1958) formulates an elaborate, occasionally repetitious argument against Rudolf Carnap and other "enemies of intuition". He imagines (*sic*) the following objection:

> "But there is no … agreement among various philosophers' intuitions as to which propositions are necessary, which entail which, and which are compatible with which. That's why an analytic philosophy based on alleged intuitions of logical necessity and possibility is really based on quicksand" (p. 420).

This is his more than adequate reply:

> "It is true that the meanings of philosophically interesting terms of everyday language and even of scientific language are sufficiently inexact to allow considerable leeway in the choice of criteria of adequacy. But, on the other hand, they are also sufficiently definite to **impose** some **criteria of adequacy** as statements [elsewhere: pre-analytic entailments] which cannot be denied without changing the ordinary meanings of their terms" (p. 417; the second emphasis added).

On reflection, this standpoint of 'moderate intuitionism' proves to be the only viable approach to philosophical semantics. What are the alternatives? On the one hand, (all-out) **formalism** is based on a simple logical error:

> "Whatever the merits of this Carnapian method of analysis may be, it must be conceded that it is **intuitive** necessity of propositions which guides the selection of the material criteria of adequacy for a given explication, and that if this is denied, explications appear as either circular or as philosophically irrelevant" (p. 416, original emphasis; also pp. 396-397; the notion of explication is dealt with e.g. in Itkonen 1978: 301-310).

In other words, 'complete formalization' is a chimera. The process of formalization presupposes the existence of some X which is to be formalized; and there is at least some sense in which X exists, **un-**formalized, before the process of formalization starts. What is X? In semantics, X is a set of pre-theoretical (or 'pre-analytic') entailments. The 'X' of formal logic will be revealed in Appendix 3.

On the other hand, all-out **empiricism** (= physicalism/behaviourism/psychologism) has little (or no) intellectual credibility (cf. Section 24 [= 'The fallacy of empirical philosophy'] in Itkonen 2018).

The analogy between (Pap-type) intuition-based philosophy and intuition-based autonomous linguistics was the basic insight of my 1974 dissertation. Next, the analogy was extended to formal (= deontic) logic in my 1975 booklet *Concerning the relationship between linguistics and logic* (summarized in Itkonen 1978: Ch. 10).

Appendix 4: The Fallacy of Complete Formalization in Logic

"**Modern** logicians have often pointed out that there is no justification for the habit of **traditional** logicians to accord the privileged status of 'laws of thought' to the laws of contradiction, excluded middle, and identity rather than to any other tautology. And as a *reductio ad absurdum*, as it were, of the view that these are the fundamental postulates of logical thinking it is sometimes pointed out that in the system of *Principia Mathematica* they occur as rather remote theorems. It seems to me, however, that a defense of the traditional view within the framework of modern logic is possible … If we wish to **justify** those axioms of *Principia Mathematica* that belong to propositional logic … , we must have recourse to truth-tables, and the fundamental convention underlying truth-table calculations, that every proposition has at least and at most one of the truth-values 'true' and 'false', is nothing else but the metalinguistic formulation of the laws of contradiction and excluded middle. And the rule that the same truth-value must be assigned to the same propositional variable corresponds to the law of identity" (Pap 1958: 151; emphasis added). "This simple consideration shows that the claim that our knowledge of the laws of logic is purely **formal**, not **intuitive** …, must be taken with a grain of salt" (p. 157; original emphasis).

It is difficult to imagine (*sic*) a more convincing way to refute the idea of complete formalization in logic. Still, Michael Kac points out an important qualification. Mathematicians are free to invent uninterpreted (and, in this sense, arbitrary) formal systems, which may or may not receive a meaningful interpretation afterwards. In such a case, it is **not** true (as was claimed in Appendix 1) that the process of formalization presupposes some X which is known to exist prior to this process.

Appendix 5: A Note on Axiomatics

We have just seen that, according to Pap (1958: 151), there is a difference of opinion between 'traditional' vs. 'modern' logicians insofar as the former, unlike the latter, assumed that, in some sense, the following 'laws of thought' constitute the basis of all logic:

(a) the law of (non-)contradiction = $\sim(p \,\&\, \sim p)$

(b) the law of identity = $p \rightarrow p$

(c) the law of the excluded middle = $p \vee \sim p$

*Ad* (a): "The most certain principle of all is that regarding which it is impossible to be mistaken …: the same attribute cannot at the same time belong and not belong to the same subject and in the same respect" (Aristotle, *Metaphysics* 1008, 5-10).

*Ad* (b): "We take the law of identity to be a truth about entailment; $A \rightarrow A$ represents the archetypal form of inference, the trivial foundation of all reasoning, …" (Anderson & Belnap (1975: 8).

*Ad* (c): Although the law of the excluded middle is no longer valid in three-valued logic or, more generally, in many-valued logic, "there is reason to think that two-valued logic remains a sort of

'primary' logic. It is significant that the **meta**language of many-valued logic remains two-valued. For instance, when we say that the truth-value of *p* is 0.8 [and not simply either 1 or 0], we certainly intend **this** (metalinguistic) sentence to belong to the realm of two-valued (and not many-valued) logic" (Itkonen 2003: 84). Let us point out the following analogy. Some of our (unconscious) reasoning may be performed **sub**symbolically, as suggested by neural-network and/or connectionist models. But it is absolutely certain that our **meta-**reasoning, exemplified by comparisons between the respective merits and dismerits of symbolic vs. subsymbolic models, cannot be performed subsymbolically. Why not? Because it is performed by means of ('scientific') English, which is most definitely a **symbolic** system of communication.

As noted by Pap (1958: 151), the privileged status of (a)-(c) disappears in **axiomatizations** of propositional logic (constructed in the tradition of *Principia Mathematica*), insofar as (a)-(c) occur as "remote theorems". This idea is confirmed in Itkonen (2003: 65), namely by showing that the proof of $p \rightarrow p$ in Hilbert & Ackermann's (1928: 22) axiomatization contains **seven** distinct stages, i.e. two axioms, one theorem, and six (perhaps simultaneous) applications of the (two) inference rules (i.e. either Substitution Rule or *Modus Ponens*). This state of affairs can be interpreted in two opposite ways: **Either** the intuitions of 'traditional logicians' are **right**, but axiomatization just happens to be unable to express them; **or** axiomatization, the basic tool of 'modern logicians', has shown these intuitions to be **wrong**. If forced to choose, I would choose the former alternative (as would Pap, too).

Hilbert & Ackermann's (1928: 22) system contains the following four axioms:

A1) $(p \vee p) \rightarrow p$

A2) $p \rightarrow (p \vee p)$

A3) $(p \vee q) \rightarrow (q \vee p)$

A4) $(p \rightarrow q) \rightarrow [(r \vee p) \rightarrow (r \vee q)]$

A1)-A3) are of course extremely simple; and A3) looks almost indistinguishable from $p \rightarrow p$; but A4) is already moderately complex. Now, the seven-stage proof of $p \rightarrow p$ within this system teaches two important lessons about the nature of axiomatics: "First, although $p \rightarrow p$ looks rather trivial, it **must** be proved as long as it is not an axiom. Second, it is not possible to systematize the propositional logic on the basis of one simple axiom like $p \rightarrow p$. This truth can be seen as an indirect refutation of any metaphysical claims made to the effect that something very large can actually be 'seen' in something very small. For instance, Descartes was quite wrong to claim that, if he just were given one point of certainty, he could derive everything else from it (cf. Itkonen 1983: 225-227, 1991: 261)" (Itkonen 2003: 65-66).

Appendix 6: Concerning the Overlap between Intuition and Imagination

Every natural language is a system of norms. A norm determines what is either correct or incorrect. Norms of language, first, correlate forms with meanings and, second, combine meaningful forms so as to produce sentences. (In)correctness is not accessible to sense-perception, i.e. it is not an observable property. Therefore we say that (in)correctness is grasped by means of **intuition**. This is certainly true of the

(in)correctness of linguistic **forms**: this is how we know that *The man came in* is correct whereas **Man the came in* is incorrect (to repeat what has been my standard example ever since my 1974 dissertation).

It does not seem to be the case that any kind of (linguistic) **imagination** is involved in grasping the formal correctness of *The man came in* and the formal incorrectness of **Man the came in*. But, importantly, things are different when we consider linguistic **meanings:** our discussion in Section 4 made it clear that the semantic nature of (7)-(9) is grasped by (linguistic) imagination, which seems here indistinguishable from (linguistic) intuition. We reach the same result when we consider semantically incorrect (= anomalous) sentences like Russell's (1962/1940: 158) *Quadruplicity drinks procrastination*, which was duly superseded in the popular imagination by Chomsky's (1957: 15) *Colorless green ideas sleep furiously*. Clearly, understanding the nature of such sentences requires 'imagination in action': it consists in trying, and failing, to **consistently imagine** a situation in which they would be appropriate. Thus, preliminarily: linguistic form = intuition & non-imagination vs. linguistic meaning = intuition & imagination.

As exemplified by Thompson & Hopper (2001), there are recurrent (though unsuccessful) attempts in linguistics to replace intuition by observation (of attested utterances). In logic, by contrast, analogous attempts are non-existent: intuition has no serious rivals (apart from vacuous claims to the effect that, one day, logic may 'ultimately' be reducible to sense-perception). Now if, in linguistics, **formal correctness** is a matter of intuition, but not of imagination, the same seems to be true of **well-formedness** in logic. (Of course, the same analogy holds between **in**correctness and **ill**-formedness.) It is not even clear what it would mean to say that any kind of **imagination** is required to recognize the well-formedness of e.g. $(p \vee q) \rightarrow r$ or $\sim p \,\&\, q$ and the ill-formedness of e.g. $(p \vee q) \rightarrow$ or $p\sim \,\&\, q$, etc. Hence, to understand the role of imagination in logic, we have to turn to **(in)validity** (as we already did in Section 6).

Standard propositional logic and predicate logic are closed systems to the extent that it takes an extra effort to see what is (or has been) the role of intuition/imagination in their construction. A more informative answer is provided by different versions of non-standard (or 'philosophical') logic. Let us first consider some fundamentals of modal logic:

"There are certain conditions which it seems intuitively reasonable to demand that a system should fulfil if it is capable of interpretation as a modal system. These conditions … will require that certain formulae should count as valid (or as theses [= axioms, theorems, or definitions], if the system is set out axiomatically) and that certain others should not; but for some formulae they will leave the question of their validity or invalidity undecided" (Hughes & Cresswell 1972: 25; for discussion, cf. Itkonen 2003: 85-89). The above-mentioned "conditions" are identical with what Pap (1958: 416-417) calls "criteria of adequacy". Hughes & Cresswell (1972) adduce five such criteria for modal logic, including the following three:

(a) If $Lp$ = 'it is necessarily true that p' and $Mp$ = 'it is possibly true that p', then the following equivalences must be theses: $Lp = \sim M\sim p$ and $Mp = \sim L\sim p$. (Here and in what follows, equivalence is expressed by identity.)

(b) *If* $p$ |-- $q$ = '$p$ entails $q$', then it is equivalent to $\sim M(p \,\&\sim q)$.

(c) The following implications must be theses: $Lp \rightarrow p$ ('if $p$ is necessarily true, then $p$ is true') and $p \rightarrow Mp$ ('if $p$ is true, then $p$ is possibly true').

What does it mean to say that the validity of (a)-(c) is known by means of (logical) intuition? In the spirit of Sections 3)-7), and hence unexpectedly, it means that their falsity in **unimaginable**.

Next, let us consider the notion of **testability** in (autonomous) linguistics and in formal (here: deontic) logic. It is based on the following **analogy**: just as a (generative) grammar of a language L is tested by finding out whether it generates all, and only, intuitively **correct sentences** of L, so an axiomatization of deontic logic is tested by finding out whether it generates all and only intuitively **valid** (deontic) **formulae**. A system **over**-generates, if it generates what it should not, i.e. either intuitively incorrect sentences or intuitively invalid formulae; and it **under**-generates if it does not generate what it should, i.e. either intuitively correct sentences or intuitively valid formulae. A system is defective, i.e. in need of revision, to the extent that it either over-generates or under-generates.

Let us consider von Wright's (1951) Old System of Deontic Logic (where $Op$ = 'one ought to do $p$', $Pp$ = 'one is permitted to do $p$', $O(p \rightarrow q)$ = 'doing $p$ commits one to doing $q$'). Let us concentrate on the following formulae:

(d) ~(Op & O~p) (= 'It is not the case that one ought to do $p$ and that one ought to do its opposite, i.e. *not-p*').

(e) O(p & q) = (Op & Oq) (= 'If, and only if, one ought to do $p$ and $q$, then one ought to do $p$ and one ought to do $q$')

(f) Op = ~P~p (= 'If, and only if, one ought to do $p$, then one is not permitted to do *not-p*'); Pp = ~O~p (= 'If, and only if, one is permitted to do $p$, then it is not the case that one ought to do *not-p*')

(g) Op → O(p V q) (= 'If one ought to do $p$, then one ought to do $p$ or to do $q$, i.e. anything whatever')

(h) Op → O(~p → q) (= 'If one ought to do $p$, then doing *not-p* [i.e. what is forbidden] commits one to do $q$, i.e. anything whatever')

(i) P(p V q) → (Pp & Pq) (= 'if one is permitted to do $p$ or $q$, one is permitted to do $p$ and one is permitted to do $q$')

Formula (d) is the deontic counterpart of the law of (non-)contradiction, i.e. (a) in Appendix 4; (e) regulates the distribution of the $O$-operator, in analogy to $L(p \& q) = (Lp \& Lq)$ in modal logic; and (f) is the deontic counterpart of (a) in modal logic (cf. above). Clearly, (d)-(f) are intuitively valid, as shown by their status within the Old System: (d) and (e) are the two axioms of this system (in addition to the standard axioms of propositional logic, i.e. A1)-A4 in Appendix 4), while (f) is the basic definition of this system. But how do we know the intuitive validity of (d)-(f)? The answer is the same as before: we just cannot **imagine** a counter-example.

By contrast, formulae (g)-(i) reveal the limitations of the Old System. On the one hand, (g) and (h) **are** generated by the system although they are intuitively **invalid**. On the other, (i) is **not** generated by the system although it is intuitively **valid**. Once these defects were pointed out to von Wright, he made corresponding amendments (cf. Itkonen 1978: 282-287, 2003: 98-103. But here we are interested only in the following more general question: What does it mean to say that logical intuition tells us these facts about (g)-(i)?

Once again, the answer consists in finding out what we can or cannot (consistently) imagine. For instance, (g) would be valid only if we could not imagine a pair of actions *p* and *q* which falsify it. And of course, we can imagine any number of such action pairs, e.g. *p* = 'to pay taxes' and *q* = 'to kill innocent people'. And of course (h) too is false on the same interpretation. On the other hand, (i) would be invalid only if we were able to imagine a counter-example; but we are not.

In hindsight, it is easy to see that these defects result from the fact that the Old System imitates too closely standard propositional logic: (g) and (h) are wrongly assumed to be valid, because $p \rightarrow (p \vee q)$ and $p \rightarrow (\sim p \rightarrow q)$ are tautologies (the latter formula being equivalent to $(p \& \sim p) \rightarrow q$ = 'anything follows from a contradiction'), while (i) is wrongly assumed to be invalid because $(p \vee q) \rightarrow (p \& q)$ is not a tautology.

Since we are dealing with imagination, let us add a truly imaginative postscript. In a public talk over 40 years ago, I was discussing the invalidity of (h), when a member of the audience (who happened to be an expert both on philosophy and on classical philology) suggested its validity on at least one (context-dependent) interpretation. In ancient Rome, if a patrician lady suffered utter disgrace (like being raped), or ~*p*, she was taken to be released from the bonds of common morality, which entailed that she was apt or entitled to do **anything**, or *q*. Could it be that such deep under-currents of the human psyche are, after all, embodied by von Wright's Old System?

Appendix 7: More on Wittgenstein on Imagination

Wittgenstein's method of 'analysis-by-imagination' is nowhere more in evidence than in the first part of the *Brown Book* (= Wittgenstein 1958b: 77-125), which covers much more systematically the same area which is covered, with many interruptions and additions, by Wittgenstein (1958a: §1 – §87). Starting from a very simple language game between a builder and his assistant, the reader is instructed to **imagine** well over 70 increasingly complex language games, for instance:

"Imagine this language: 1) Its function is the communication between a builder A and his man B. B has to reach A building stones. …" (p. 77).

2) "Let us now look at an extension of language 1). …" (p. 79).

3) "Let us introduce a new instrument of communication, -- a proper name …" (p. 80).

5) "Questions and answers: …" (p. 81).

6) "Asking for the name: … (p. 81)

11) “Consider this variation of our language game 2). …” (p. 83).

17) “Imagine on the other and that the order has been, …” (p. 85).

21) Consider this example: … (p. 90). “Let us consider two games. …” (p. 91).

30) “A certain tribe has a language of the kind 2) …” (p. 93).

31) “Another tribe. Its language is like that in 30). …” (p. 93).

32) “A tribe has two systems of counting. …” (p. 94).

49) “Imagine a tribe in whose language there is an expression corresponding to our ‘He has done so and so’, …” (p. 103).

67) “Imagine that human beings or animals were used as reading machines; …” (p. 120).

69) “Or imagine this case: A man under the influence of a certain drug is shown a group of five signs, …” (p. 122).

In all examples adduced so far in this article, Wittgenstein is making use of **voluntary** imagination: “It is just because imagining is subject to the will that it does not instruct about the external world” (1980: § 80). But then, suddenly, he realizes what should have been obvious all along (cf. here Sect. 13): “One objection to the imagination’s being voluntary is that images often beset us against our will and remain, refusing to be banished” (§ 86). Of course!

Still, at least some 90% of the time, Wittgenstein is occupied with voluntary imagination, for instance: “We certainly speak of calculating in our imagination. So it is not surprising that the power of imagination can contribute to knowledge” (1980: §542). But, as we just saw, it is **not** knowledge of the external world (except in a roundabout way).

Appendix 8: A Note on Psychology of Logic

What follows is a bird’s-eye-view of the entire domain of logic. At one extreme, we have formal logic (exemplified here by standard propositional and predicate logic). At the other extreme, we have people’s actual inferential (= ‘logical’) behaviour. For psychology, all types of behaviour are on an equal footing. Behavior-explanation is the task of psychology. Now, how is ‘logical’ behaviour explained? And, more importantly, how **should** it be explained?

For a long time, the usual method of explaining ‘logical’ behaviour has been simply to postulate formal logic within people’s minds. *Prima facie*, this is quite implausible because, by the standards of formal logic, people’s behaviour is, more often than not, **illogical** rather than logical. (This explains the use of scare quotes when speaking of ‘logical’ behaviour.) So why has this method been chosen, if it is so implausible? This question admits of a ‘graded’ answer.

First of all, this was the easy way. Formal logic was there already, and it seemed natural to use it, especially since there was no obvious alternative. But then an additional justification was invented. In

linguistics, Chomsky had made the 'competence vs. performance' distinction scientifically respectable (or so it seemed). Why not extend it to logic as well? Formal logic is competence; inferential behaviour is performance; and (as is well known) there is no limit to how much performance can be allowed to diverge from competence.

This argument may look cogent, but only to a very casual observer. In reality, the scientific status of 'competence' was suspect from the start. Let us repeat a quote from Section 12: "The competence of the 'ideal speaker' is a 'mental grammar', but this grammar is an imitation of axiomatic systems which were constructed for the description of **artificial** languages" (Itkonen 1976: 215; original emphasis). Psychological theories should be constrained by experimental facts, but this was never the case for the Chomsky-type competence. Within psychology of logic, putative explanations-by-competence contain an implicit circularity: 'logical competence' was thought to be supported by the notion of 'linguistic competence'; but there was no linguistic competence; what was thought to be linguistic competence was formal logic (= axiomatic system), pure and simple; nor was there any (genuine) logical competence; there was only formal logic, pure and simple.

Thus, there is a huge gap between formal logic and actual inferential behaviour. Still, if it were true that there is no alternative, we would have to accept explanations of inferential behaviour based, in one way or another, on formal logic. But this is **not** true. For instance, the theory of (semi-pictorial) 'mental models' provides alternative explanations that do much better justice to statistical variation in inferential behaviour (cf. Johnson-Laird 1983, Johnson-Laird & Byrne 1991; also Itkonen 2003: Chapter XV [= 'Psychology of Logic']).

Let us see, in conclusion, what the theory of mental models entails for the topic of this article. Johnson-Laird & Byrne (1991) offer the following preliminary summary: "In the first stage, … [reasoners] construct an internal model of the state of affairs that the premises describe. … In the second stage, [they] try to formulate a parsimonious description of the models they have constructed. This description [= conclusion] should assert something that is not explicitly stated in the premises. … In the third stage, reasoners search for alternative models of the premises in which their putative conclusion is false. If there is no such model, the conclusion is valid" (p. 35). This three-stage process is governed by the principle that "mental models have the same structure as human conceptions of the situations they represent" (p. 38). "The tokens of mental models … may not be directly accessible to consciousness" (p. 39).

Let us sum up some of the most important implications: First, mental models are **analogous** to situations they represent. Second, they are constructed by means of **imagination**. Third, we have discovered a new subtype of imagination, namely the voluntary and yet **unconscious** one. Fourth, imagination is equally important in **formal** logic and in **natural** logic (= logic conceived of as a psychologically real phenomenon).

## Appendix 9: Itkonen (1983) on Imagination and (Non-)Empiricalness

"Hume is rightly considered as the most articulate representative of British empiricism, and it might accordingly be thought that the method employed by him has to be in some sense **empirical** in

character. In fact, Hume himself expounds at great length the 'experiments' which he makes use of in pursuing his argument (1972/1739-40: 86-98). On closer inspection, however, it turns out that he is speaking of **thought experiments** analogous to those which, for example, 'ordinary language philosophers' constantly relied upon, and which consisted in answering, in different **imaginary** contexts, the question: 'What would you say (or do), if …?' Today, of course, practitioners of linguistic pragmatics conduct their own research by giving answers to the same question. Now, as Wittgenstein (1958/1953: I, §265) points out, a thought experiment is not an experiment, and therefore a discipline which manages to depend solely on thought experiments could not possibly qualify as empirical" (p. 301; the third emphasis added).

References


Anderson, Alan Ross & Belnap, Nuel D. 1975. *Entailment: The logic of relevance and necessity. Vol. I.* Princeton UP.

Aristotle (1941). *The basic works of Aristotle.*Edited and with an introduction by Richard McKeon. New York: Random House.

Bergman, Gustav. 1957. *Philosophy of science*. Madison: The University of Wisconsin Press.

Bybee, Joan & Hopper, Paul (eds.) 2001. *Frequency and the emergence of linguistic structure.* Amsterdam: Benjamins.

Chomsky, Noam. 1957. *Syntactic structures*. The Hague: Mouton.

Cruse, Alan. 2000. *Meaning in language*. Oxford UP.

Davidson, Donald. 1975. Thought and talk. Samuel Guttenplan (ed.): *Mind and language* (pp. 6-23). Oxford: Clarendon Press.

Geeraerts, Dirk & Cuyckens, Hubert (eds.) 2007. *The Oxford handbook of cognitive linguistics*. Oxford UP.

Hilbert, David & Wilhelm Ackermann. 1928. *Grundzüge der theoretischen Logik*. Berlin: Verlag von Julius Springer.

Hume, David. 1972/1739-1740. *A treatise of human nature, Books II and III*. Glasgow: Fontana/Collins.

Itkonen, Esa. 1974. *Linguistics and metascience*. Studia Philosophica Turkuensia II.

___ 1975. *Concerning the relationship between linguistics and logic*. Distributed by the Indiana University Linguistics Club.

___ 1976. The use and misuse of axiomatics in linguistics. *Lingua 38, 3/4: 185-220.*

___1978. *Grammatical theory and metascience*. Amsterdam: Benjamins.

___ 1983. *Causality in linguistic theory*. London: Croom Helm.

___ 1991. *Universal history of linguistics: India, China, Arabia, Europe*. Amsterdam: Benjamins.

___ 2003. *Methods of formalization beside and inside both autonomous and non-autonomous linguistics*. University of Turku: Publications in General Linguistics 6.

___ 2005. *Analogy as structure and process: Approaches in linguistics, cognitive psychology, and philosophy of science*. Amsrerdam: Benjamins.

___ 2008. The central role of normativity in language and linguistics. J. Zlatev et al. (eds.). *The shared mind: Perspectives on intersubjectivity*. Amsterdam: Benjamins.

___ 2013. Functional explanation and its uses. Shannon T. Bischoff & Carmen Jany (eds.): *Functional approaches to language* Amsterdam: Benjamins.

___ 2016. An assessment of mentalist cognitive semantics. *Public Journal of Semiotics.*

___ 2018. In defense of traditional semantics (and against all-out psychologism). *Homepage*.

Johnson-Laird, Philip N. 1982. Formal semantics and the psychology of meaning. Stanley Peters & Esa Saarinen (eds.): *Processes, beliefs, and questions* (pp. 1-68). Dordrecht: Reidel.

___ 1983. *Mental models.* Cambridge UP.

___ & Ruth M.J. Byrne. 1991. *Deduction*. Hillsdale: Lawrence Earlbaum Associates.

Kneale, Martha. 1970. Dreaming. *Knowledge and necessity* (pp. 236-248). *Royal Institute of Philosophy Lectures, Vol. 3*. London: Macmillan.

Kroy, Moshe. 1976. *Mentalism and modal logic.* Wiesbaden: Athenaion.

Lakoff, George. 1987. *Women, fire, and dangerous things*. Chicago UP.

Lehrer, Keith. 1974. *Knowledge*. Oxford: Clarendon Press.

Lovejoy, Arthur O. 1936. *The great chain of being: A study of the history of an idea*. Cambridge, MA: Harvard UP.

Mundle, C.W.K. 1970. Philosophical behaviourism. *Knowledge and necessity* (pp. 119-131). *Royal Institute of Philosophy Lectures, Vol. 3.* London: Macmillan.

Pap, Arthur. 1958. *Semantics and necessary truth: An inquiry into the foundations of analytic philosophy*. New Haven: Yale UP.

Plato (1963). *Collected dialogues.* Edited by Edith Hamilton & Huntington Cairns. Princeton UP.

Quine, Villard van Orman. 1967 [1953]. *From a logical point of view*. Harvard UP.

Russell, Bertrand. 1962/1940. *An inquiry into meaning and truth*. Penguin Books.

Thompson, Sandra A. & Hopper, Paul. 2001. Transitivity, clause structure, and argument structure: Evidence from conversation. In: Bybee & Hopper (eds.): 27-60.

Von Wright, Georg Henrik. 1951. Deontic logic. *Mind 60: 1-15.*

___ 1971. *Explanation and understanding*. London: Routledge.

Whitney, William Dwight. 1979/1875. *The life and growth of language*. New York: Dover.

Wittgenstein, Ludwig. 1958a/1953. *Philosophical investigations*. Oxford: Blackwell.

___ 1958b. *The blue and brown books*. Oxford: Blackwell.

___ 1967/1956. *Remarks on the foundations of mathematics*. Oxford: Blackwell.

___ 1980. *Remarks on the philosophy of psychology, Vol. II.* Oxford: Blackwell.