RIVISTA INTERNAZIONALE DI FILOSOFIA E PSICOLOGIA
DOI: 10.4453/rifp.2014.0014
ISSN 2039-4667; E-ISSN 2239-2629
Vol. 5 (2014), n. 2, pp. 169-183

Studi

Syntactic Structures and the *Conscious Awareness* of Language Experience. An Intermediate Level Hypothesis

Francesco Marchi & Giacomo Romano[1]

Ricevuto il 9 giugno 2013; accettato il 31 gennaio 2014

Abstract In this article we review the basic idea of the "intermediate level" hypothesis about consciousness as proposed by Ray Jackendoff, then developed by Crick and Koch and finally by Prinz. According to this hypothesis, consciousness arises only at an intermediate-level, which lies between rough sensory inputs and the more abstract representations used, e.g., in object recognition. We aim at formulating a more specific hypothesis about a suitable conception of consciousness relative to the experience of language. We claim that "linguistic consciousness", namely an individual's conscious experience engendered by the processing of linguistic information, cannot be identified only in the phenomenal role played by the phonological structure of language, contrary to what Jackendoff holds. Instead, we hypothesize that the top-down computational structure required for the very possibility of linguistic consciousness is determined by syntax (meaning generally by "syntax" the generative system that organizes linguistic information through transformational frames in cooperation with various interface components). This hypothesis, we believe, avoids two problems with Jackendoff's original account.
KEYWORDS: Consciousness; Language Experience; Sintax; Ray Jackendoff; Jesse Prinz

Riassunto *Strutture sintattiche e coscienza vigile dell'esperienza linguistica. Un'ipotesi sul livello intermedio.* In quest'articolo facciamo riferimento all'idea di fondo dell'ipotesi di "livello intermedio" sulla coscienza, così come è stata proposta da RayJackendoff, poi sviluppata da Crick e Koch e infine da Prinz. In base a questa ipotesi la coscienza emerge solamente ad un livello intermedio che si trova tra la ricezione di input sensoriali grezzi e l'elaborazione più astratta di rappresentazioni usate, per es. nel riconoscimento degli oggetti. Abbiamo l'obiettivo di formulare un'ipotesi più specifica relativa ad una concezione adeguata della coscienza dell'esperienza del linguaggio. Sosteniamo che la "coscienza linguistica", vale a dire, l'esperienza cosciente generata dall'elaborazione dell'informazione linguistica in un individuo, non può essere identificata solamente nel ruolo fenomenico implementato dalla struttura fonologica del linguaggio, contrariamente a quanto affermato da Jackendoff. Riteniamo invece che la struttura computazionale top-down richiesta come presupposto per la coscienza linguistica sia determinata dalla sintassi (intendendo generalmente per "sintassi" il sistema generativo che organizza l'informazione linguistica mediante delle strutture trasformazionali in collaborazione con vari elementi che svolgono la funzione di interfaccia). Quest'ipotesi, a nostro modo di vedere, evita due problemi che erano presenti nella teoria originaria di Jackendoff.
PAROLE CHIAVE: Coscienza; Esperienza linguistica; Sintassi; Ray Jackendoff; Jesse Prinz

F. Marchi - Institut für Philosophie - Ruhr-Universität Bochum - GA3/139 Universitätstrasse, 150; D - 44780 Bochum (✉)
E-mail: francesco.marchi@rub.de

G. Romano - DISPOC - Dipartimento di Scienze Sociali, Politiche e Cognitive, Università di Siena - Palazzo San Niccolò, via Roma, 56 - I-53100 (✉)
E-mail: romano29@unisi.it

Introduction

THE MAIN GOAL OF THIS paper is to formulate a hypothesis about linguistic consciousness, within a computational-representational framework. By "linguistic consciousness" we mean the conscious experience related to the processing of linguistic information.

Our proposal is based on the *Intermediate Level Theory of Consciousness* (ILTC) exposed by Ray Jackendoff in his book *Consciousness and the computational mind*, published in 1987. Jackendoff's effort aimed at moving a step forward from more classic computational theories, showing that his proposal was consistent with empirical data and models available to him. We have adopted ILTC for this reason, and because it provides an interesting theoretical perspective on the investigation of mental processes. Furthermore, we think that the conception of *conscious awareness* that hails from Jackendoff's proposal is a sound and refreshing alternative to the other hypotheses floating around. However, Jackendoff's theory needs to be updated to contemporary data and findings from neuroscience, a challenging task taken up by Jesse Prinz in his 2012 book *The Conscious Brain*. This recent reinterpretation of Jackendoff's ideas is mainly focused on vision and visual awareness.

In order to show the critical elements for a computational intermediate level hypothesis, we present Jackendoff's original theory and its revision by Prinz. Then we discuss Jackendoff's account of the faculty of language, showing the limits of his theoretical proposal as a sound framework for linguistic consciousness. In a further section we resort to the ILTC framework and provide some emendations to it, in order to outline an alterative hypothesis for the conscious experience of language. It is important to clarify that we don't commit to the implications of ILTC. We are aware that the theory has several controversial aspects, some of which we address and try to resolve. This is rather an instrumental approach to the problem of linguistic consciousness, in which ILTC constitutes a valuable tool to inquire some general aspect of this phenomenon.

The Intermediate Level Theory of Consciousness

In this paragraph we present Jackendoff's *Intermediate Level Theory of Consciousness* as it was originally formulated in 1987. We try to elicit its core aspects in the most general way, in order to allow the reader to follow our line of argument and the development of our proposal.

ILTC is a computational theory. It relies on the mind-computer analogy and its core assumption is that the human brain could be considered as a computational device, working as an information processor. In this view the mind can be thought of as a collection of different computational structures. The aim of Jackendoff's proposal is to identify which of these structures are involved and make possible the arising of consciousness. For the purpose of this paper, we have to clarify the kind of "consciousness" that we are talking about. The author makes a distinction between two different types of mind processes:[2] those pertaining to the computational mind, such as reasoning, understanding and decision making; and those relative to the phenomenological mind, such as perception and experience of the world and our inner emotions and lives.[3]

Only the second kind of mind processes are identified as elements of conscious awareness and constitute the object of the author's inquiry. Once this distinction has been established we can look for these elements in the mind from a functional point of view, describing those computational processes, which may produce our phenomenological experience. In his early version of the theory Jackendoff seems to argue for some peculiar kind of supervenience theory. He claims that the elements of conscious awareness (in the phenomenological mind) are

caused by/sup-ported by/projected from privileged infor-mation processes in the computational mind.[4] In order to further specify this initial supervening conception of consciousness, the author needs to introduce a crucial notion into the theory, the notion of "levels".

If the brain is a computational device, it is capable of processing information. Information, on the other hand, constitutes a representation of the external world that can be received and processed by the brain. However, not all of the information that comes to our sensory receptors is of the same kind: auditory information is different from visual information, visual information is different from haptic information, etc. Moreover, even the information relative to the same sensory modality admits different degrees of organization, in order to serve different purposes. Jackendoff proposes that such degrees of organization of the computational flow correspond to specific levels of informational structure. A level of informational structure is a collection of information of some specific functional kind, i.e. processed to different extents and for different purposes, which maps and represents specific features or characteristics of the stimulus. Levels may differ with each other in virtue of their informational content (different modalities) or by their degree of organization (same modality). In the latter case each level derives its basic informational input from the level below in a serial computational sequence.

Jackendoff distinguishes at least three different levels of information processing for each sensory modality. A primary level (low level) provides representations directly derived from the very first sensory input conveyed by receptors (i.e. the retinal stimulus).[5] This level is supposed to be disorganized and not directly identifiable with the objects or elements of the world that are generating it. At a secondary level (intermediate level) the representation of the object starts to be arranged and organized in more consistent patterns. At this point information about spatial relations, potential identity and other aspects of the stimulus starts to emerge. The representations developed at this level can be considered as an actual model of the stimulus. It is important to underline that the first two levels are specific for each modality. Visual intermediate level representations are considered to be very different from auditory ones. In both cases the representations must show a significant degree of analogy with the stimulus generating them, thus allowing for different types of conscious states.

The final level of information processing (high level) is a proper abstract model of the perceived stimulus. At this level the general features of the stimulus are stored and integrated with previous data coming from the same modality or even from different sensory inputs. This abstract model at the high level is not analogous to the stimulus. More precisely, the high-level model involves all of the stored abstract information about the stimulus, it is object centered and modally a-specific, and therefore it is the only one that can be shared by all the different sensory modalities. This model allows an interface between different faculties (i.e. visual and auditory); it achieves stimulus recognition on the basis of partial information and facilitates integration with the deep, specifically computational elements of the mind, such as reasoning and knowledge.

Once Jackendoff has established the distinction between different levels of informational structures, he formulates his most remarkable claim: *the only adequate level for allowing the arising of consciousness is the intermediate level*. This idea relies on the intuition that, introspectively, our conscious experience of an object is neither an abstract and formalized object-centered model, nor a blurry chaotic mix of different stimulus features. On the contrary, our experience appears to be subject-centered and firmly anchored to a first person perspective, while showing a certain degree of organization and integration of modally distinct aspects of the stimulus. The intermediate level of representation is the only one that presents these cha-

racteristics of sufficient organization and modal specificity. The requirement of modal specificity stems from the possibility to have visual experience separately from auditory experiences, haptic experiences etc. Although, our experience of the world usually involves phenomenal features of various modalities, which are integrated in a coherent scene, each of these features seems to be separable from the others, in the sense that the presence of a sound, doesn't entail the phenomenal presence of a corresponding visual image or tactile experience.[6] From these considerations, Jackendoff concludes that the elements of conscious awareness must be caused by/supported by/projected from informational structures of the intermediate level.

This is a brief sketch of the core schema of the ILTC in its original formulation.[7] Jackendoff has taken into consideration mainly three types of conscious awareness, visual awareness, musical awareness and linguistic awareness. We shall not discuss musical awareness since it falls out of the scope of this paper. In the last 20 years there has been a massive development of relevant empirical data about vision; thus it seems more interesting to review the recent re-elaboration of ILTC about visual awareness discussed by Jesse Prinz. This review will be subject matter of the next section.

Recent revaluation of the ILTC

In 1987 Jackendoff proposed only three different levels of informational structure, referring to the data available to him.[8] Nowadays, we know that there are many more levels and sublevels. However, the proliferation of levels may still be compatible with a classification into low, intermediate and high level groups of informational structures. Thus, the very central assumption of the theory still holds. This is what the philosopher Jesse Prinz argues for in his recent book *The Conscious Brain*.

Already in 2007, in his article *The Intermediate Level Theory of Consciousness,* Prinz offered a review of the ILTC, which worked as a basis for his own proposal. Basically, his argument is founded on two considerations. The first concerns the fact that a significant amount of cognitive scientists and philosophers are by now inclined to accept some form of the mind-computer analogy. The second is based on the assumption, widely shared in the community of neuroscience, that most of our brain faculties present a hierarchical structure. It follows that a computational theory hinged on a detailed and plausible notion of hierarchical structure, such as the original ILTC, can be considered a foreseeing intuition rather than an outdated perspective. Therefore, the real contemporary issue will be to test its consistency with a complex compound of data that was not available when the theory was first formulated.

Prinz claims that, at least in the case of vision, the framework of ILTC is still plausible. Research concerning the structure of visual cortices and visual processes in the brain has discovered over a dozen of different specialized areas related to visual information processing.[9] Moreover, these areas seem to be organized not in a strictly hierarchical way. Information, for example, can flow forward and backward through different areas at different times of the processing flow. Yet it is still possible to characterize a series of low, intermediate and high levels of information processing on the basis of the type of information related to each different area or group of areas. This is highly consistent with Jackendoff's theory, the only real difference with his original proposal is that each level of this new account involves more than just one brain area.

More in detail, a viable way of characterizing the three levels distinction could be to associate low level processing areas with detection of isolated local features. The intermediate level would then be associated with perception of more integrated features like boundaries, shapes, texture and color, and

with discrimination of the object from the background. According to this account, high-level areas are related to the processing of abstract categorical information and comparative features.[10] This basic model consists in a flow of information from peripheral[11] areas (such as primary visual area V1) to more central ones (like Inferotemporal Cortex IT) associated with recognition and categorization. The connection between the two is achieved through a group of intermediate structures (corresponding to areas V2, V3 and in particular V4 in extrastriate cortex) working as an interface from local fragmentation to central abstraction, and therefore serving as a good candidate for supporting visual consciousness.

Prinz also reports some scientific data in support of his claims. First of all, studies on non-human primates[12] shows that both primary visual areas and IT are not adequate correlates of conscious experience. Early visual areas are not reliable in detecting critical differences in stimuli which are, on the other hand, present in conscious awareness, i.e. the same group of primary visual cells can be activated in front of a spatial orientation/variation in the stimulus (retinotopic map), or separated groups of cells may correspond to features which are unified in experience. Recognition areas, on the contrary, are not sufficiently, if at all, attuned to the possible variations in the perspective from which the subject looks at the same stimulus. Such perspectival shifts deeply affect experience determining core features like dimension, position, inversion, lightness and so on. Prinz suggests that Jackendoff's basic intuition still holds: conscious experience appears to be at the same time highly variable and viewpoint dependent, and yet consistent and unified. Therefore, it should be implemented on the basis of computational structures associated with the processing of information that is neither too local nor too abstract.

Furthermore, Prinz claims that the strongest support to ILTC comes from testing its predictions. One way to do this is by considering cognitive deficits related to local brain damage. If the ILTC general framework is correct, damage in early cortical areas should undermine the arising of consciousness and, in fact, a massive damage to primary visual cortex (V1) results in the phenomenon known as cortical blindness. Cortical blindness consists, broadly, in the absence of visual experience with an otherwise perfectly functional visual apparatus. Moreover, there are cases of cortical blindness conditions in which patients still experience visual hallucinations and mental imagery.[13] Since in the ILTC framework hallucinations and mental imagery can be explained as activation of intermediate level areas that are triggered by high level ones, this data is consistent with the prediction of the intermediate level theory.

From the opposite side, according to ILTC, damage to high level processing areas should not undermine the conscious experience of the stimulus, for its intermediate level representation would still be available. This is exactly the case with patients suffering from visual associative agnosia.[14] This disorder derives from damage to recognition areas of the temporal lobe. This particular condition allows a rather normal conscious experience of the environment, but prevents object recognition. For example, patients with this disorder can draw pictures that are very consistent with the stimulus they are presented with, but fail to name the stimulus if they are asked what it is or what the drawing represents.[15] In this case, the ILTC explanation is that the information processing flows from low to intermediate level, thus becoming conscious, but it cannot reach the high level domain of object recognition (associated with the infero-temporal cortex IT). Finally, there is evidence that a local damage to intermediate level areas, located in the extrastriate cortex, results in the alteration, anomaly or absence of conscious experience, consistently with ILTC assumptions.

Although the evidence proposed by the

author mainly holds for vision[16], a similar hierarchical organization can be plausibly postulated for all of the other sensory modalities and it has actually been partially confirmed by studies on the other senses.[17] Thus, considering that the core intuitions about the processes and representations underlying consciousness may apply perfectly to all modalities, further empirical proof for a generalization of ILTC to all phenomenal experience will plausibly become available in a relatively short period of time.

The last aspect to be considered is the incompleteness of original ILTC. Recent data regarding subliminal perception[18] (and also experiments on attentionalblink and inattentionalblindness, especially concerning the relation of attention and consciousness, see below[19]) have shown that a complete computational flow, from early, low-level visual areas to high-level recognition ones, can be completed without any conscious manifestation of the undergoing processes. In this case it is possible that intermediate level representations are still implemented, though not consciously perceived. A straightforward consequence of this consideration is that the activation of intermediate level areas might be necessary for conscious experience, but not sufficient. A further necessary condition (acknowledged by Prinz and, partially, by Jackendoff himself) could be the activation of some kind of top-down processes used to determine which of the available intermediate level representations will actually become conscious and how these representations are selected. Prinz proposes that this "selection device" is attentional modulation. Although we will not follow his line of argument further, this is a crucial point to underline for our purposes, since we will try to hypothesize something quite similar in the case of conscious experience of language. We hope to have shown that there are reasons to think that ILTC still constitutes a valuable approach to conscious experience in general. We turn now to the core part of the paper, namely linguistic conscious experience.

Jackendoff's account of linguistic conscious experience

In *How Language Helps Us to Think* Jackendoff offers his view about the deep relationship between consciousness and language. He ascribes the most important aspects of human intelligence, such as free will, decision making and all of those faculties that distinguish human beings among the other animals to the high-level domain, i.e. the domain of thought. In his view, thought processes are entirely unconscious. We have seen how consciousness, on the other hand, is located at the intermediate level and could be considered something not as important as thought, in relation to human development and interactions with the environment. In this picture, consciousness reveals some deep processes, which regulate cognition. More precisely, thought processes are considered as unconscious high-level processes, however, the output of these processes can be consciously experienced, albeit only in linguistic form. Hence, thought itself would not have a conscious manifestation at all without language.

This crucial claim follows from the consideration that we experience the output of thought processes in terms of, for example, logical connections like entailment etc. We don't experience thoughts themselves. Instead, we construct bits of sentences and periods from which the deep logical relations are inferable, insofar as they reflect the structure of those sentences, although they are not actually experienced. Jackendoff claims that language can indirectly express thought rules but it is not coincident with actual thinking. He is aware that such a position, as held in 1987, could deflate the role of consciousness, which would be somewhat causally powerless. It seems, in fact, that this account could be considered as an epiphenomenal perspective. To avoid this epiphenomenal drift of the ITLC Jackendoff appeals to attention (although in a rather underspecified way) as the device capable of making consciousness

effective and relevant. Attention is like a lens capable of focusing on some details of thought processes. This is possible in virtue of the allocation of more brain processing resources to the elements focused. It is important to note that, in this perspective, attention is posterior to consciousness. It enhances the contents of awareness, rather than actually conveying representations to consciousness (this marks a significant point of distance between Jackendoff's original position and Prinz's later revision of it). Language is the instrument by means of which attention focuses on some bits of our thought processes, thus making them more relevant for the computational system.

We have seen that Jackendoff's intuitions may still be consistent with what we know of the processes involved in conscious experience. However, Even if we accept his assumptions and try to explain linguistic experience through ILTC, we still need to understand which part of the linguistic flow of information, from perception of a particular kind of noises (phonetic structure) to understanding their meaning (semantic structure) is actually conscious. The question that arises is then: which is the intermediate level for the language faculty? From what has been said it follows that the higher level of language processing, concerning semantics and meanings, must be located among unconscious thought processes. Although Jackendoff doesn't claim it explicitly, he points to the fact that we are conscious of a word's *being a word*, but we are not directly and univocally conscious of its meaning, though we might be able to grasp it indirectly by groups of other words, as in descriptions, or associatively, through images. The process of grasping meanings is a high-level thought process and, therefore, a completely unconscious one.[20] The phenomenal content of linguistic consciousness is the word,[21] not the meaning.

Accordingly, Jackendoff himself claims that the only necessary and sufficient element for linguistic consciousness must be the phonological structure.[22] The main evidence behind this claim is that we can have an experience of a linguistically consistent set of sounds in an unknown language without having the slightest idea of its meaning. Thus semantic structure is cut off from actual conscious awareness of language. Moreover, says Jackendoff, language experience comes in the form of the language spoken, so we have conscious experience of English that is different from conscious experience of Italian. Meaning and semantic structure, on the other hand, are universal, i.e. they are shared by all of the possible forms of linguistic experience. One could argue that hearing words without understanding their meaning doesn't count as a proper linguistic experience, even if the subject understands that what he is hearing is a sentence and not a string of random sounds. We don't think that this is the case and we accept that a fully linguistic experience is possible without the involvement of meanings, although we hold that phonological structure alone is not sufficient for this purpose. In any case, if we accept Jackendoff's arguments, we have to rule out the direct involvement of semantics into conscious experience of language.

It is trivial that this claim must be consistent with ILTC, namely it is required that the phonological structure be associated with representations of the intermediate level. Jackendoff tries to meet this desideratum by saying that phonology is what allows the hearer to distinguish from raw sound material and bits of actual linguistic sounds, and conveys information towards full (unconscious) understanding.[23] This fits exactly the definition and role of an intermediate level representation in the ILTC framework.

To sum all this up, Jackendoff proposes that we have a specific language modality (functionally analogue to any other sensory modality). According to this account, linguistic processing, like all the other modalities, is functionally organized in vertical layers of low, intermediate and high level of information structure. The levels correspond respectively to raw sound, linguistic con-

scious experience and understanding of meaning and semantic relations. Language is also what permits conscious manifestation of thoughts and enhances some thought processes by allowing allocation of processing resources through attention. This model is mirrored in vision, hearing, etc. All of the vertically structured modalities share a horizontal intermediate level that constitutes the full manifestation of multimodal integrated conscious experience. As mentioned above, the modal specificity of the intermediate level is required to account for the possibility to have visual experiences separated from auditory ones etc. If only one kind of stimulus is present, e.g. visual vs. auditory, the information will be processed only in the visual system and the output of the (visual) primary sketch will be further processed and lead ultimately to visual intermediate level representations only (2,5D models)[24].

We agree with the general idea depicted by Jackendoff, though we consider his account of linguistic consciousness to be too partial and not completely convincing. Our skepticism is mainly motivated by Jackendoff's undervaluation of one core element of the language faculty, namely *syntax*. We will now try to show that Jackendoff's position might be threatened by some powerful objections and afterwards we make an effort to provide an alternative to his proposal.

Weaknesses of Jackendoff's approach[25]

We will now present some flaws that might considerably compromise Jackendoff's theory. The first problem to be examined is the dangerous proximity of Jackendoff's account of consciousness to epiphenomenalism (especially in the case of language). The reason of this proximity is the following: according to the original ILTC, consciousness seems to arise as an accidental manifestation of intermediatelevel processes. Moreover, these processes are even not as much relevant as their high-level counterparts, which do the hard computational work in thinking. If so, we might regard consciousness as either a powerless epiphenomenal byproduct[26] or a collection of not so relevant brain processes. As we noted, Jackendoff is aware of the problem and tries to rule out epiphenomenalism by saying that consciousness does play an active role in the horizon of brain activity by orienting attention. It is only at a conscious level that we experience the effect of focusing on a particular aspect of what our brain is unconsciously processing. The focus of attention enables a greater allocation of computational resources and, as a consequence, a richer detail in the output of the processes involved.

At first glance, Jackendoff's reply seems to actually avoid the epiphenomenal drift of the theory, though it attributes to consciousness somewhat a secondary role. After a more in depth consideration however, it is clear that this solution doesn't take the theory much further. Indeed, the epiphenomenal objection can be restated as to include attentional processes.[27]Jackendoff's counter objection, in fact, cannot avert the possibility of experience of attentional focus being itself a conscious manifestation of unconscious processes. Thus, consciousness would be confirmed as a powerless phenomenon. This is a rather crucial point for which a clear and convincing answer must be found. In our opinion, the correct strategy to avoid this epiphenomenalist threat depends on an accurate account of the role of attention and of the representations that occur at the intermediate levels. Later we will address this point in a greater detail.

A second critical point of Jackendoff's argument on linguistic consciousness regards his conception of language as the only proper thought-accessing / thought-enhancing device. We might welcome the hypothesis that language provides a peculiar way of addressing our own thoughts, which is specific of humans as the only beings to whom language is available. Yet we don't see how the conscious linguistic manifestation of thought may differ in relevance from that of the other

modalities. By strictly following ILTC, it seems that every representation at the intermediate level (be it linguistic, musical, visual, etc.), although modality specific, shares the same basic function through analogue computational structures. Hence, if linguistic consciousness allows allocation of attention to particular thought processes, the same could be said of, for example, visual consciousness. Moreover, we can easily hypothesize that some abstract relations, reflecting thought processes, can be inferred without any appeal to language.[28] Accordingly, it seems that with a sufficient number of visual conscious occurrences of the act of killing (to use Jackendoff's own example),[29] the hypothetical unconscious thought relation *xf(y)*,[30] where x represents the visual instance of the killer, *f()* represents the visual instance of the act and y the visual instance of the victim, could also be properly inferred.

These instances would represent a particular case and would not be as suitable for immediate generalization as their linguistic correspondent "a *kills* b", but even if this is true, it shows at most that language is, in this respect, more efficient. It doesn't follow that there cannot be cases in which, although visual consciousness cannot "express" thought, it can at least make the output of thought processes manifest, and enhance those processes just as well as linguistic consciousness.[31] Of course Jackendoff can reply that there are some thought relations that can be expressed only in linguistic forms like *Who killed Roger rabbit?*[32] Yet, even if we accept such reply, this seems again to make linguistic conscious manifestation of thought only more efficient for certain tasks, not more relevant for the purposes of consciousness in general.

The third objection, most important for this paper, concerns Jackendoff's account of linguistic conscious experience as supported only by the phonological structure. In particular, Jackendoff claims that the phonological structure is the only necessary and sufficient condition for having a conscious experience of language.[33] When patterns of linguistic sounds become sufficiently organized as to constitute intermediate level representations, suitable of becoming conscious, this happens only in virtue of their phonological structure.

We agree with Jackendoff to this extent, phonological structure is necessary for distinguishing between conscious perception of noises and conscious perception of language. However, we doubt that it can also be sufficient. The intuition behind this objection is quite straightforward. If I pronounce a series of words that resemble words of Italian, with no meaning or order whatsoever, to a non-Italian speaker, he might have the illusion of having the experience of a foreign language. Moreover, if I were to pronounce actual words of Italian but in a casual or deliberately incorrect order, he might be able to grasp significant bits of the phonological structure of that language without having a proper conscious experience of it.

We believe that such phenomenal difference resides at a level below the level of understanding meanings, i.e. it resides at the intermediate level. We can illustrate this point with another example. If a person learning German and find herself in a German speaking community, she might be able to recognize sentences from their structure alone, knowing that the verb would be in the second position, recognizing prepositions (albeit not knowing their exact meaning which depends on the other words they are used with) and so on. More importantly, she would be able to do this without knowing the meaning of the uttered words that she hears.

To anticipate our final point, without having developed a sufficient degree of syntactic proficiency she would be able only to hypothesize that what she's hearing is a natural language, because it comes from a human being. In fact, she could not tell the difference among bits of sentences with a specific syntactic role. We hold that this difference in language proficiency comes with a particular phenomenal character, which is exactly the

peculiar phenomenal character of linguistic experience.[34]

It might be said that being able to understand the language in question is a trivial condition for having a conscious experience of that language and Jackendoff underlines that conscious experience of language is specific for each natural language. As we have seen however, here we are not talking about specific semantic understanding, which is ruled out from the domain of consciousness by Jackendoff as well, but of a kind of phenomenology that comes about with syntactic structural organization alone. We think that this idea tells us something about nature of linguistic experience, namely that a conscious experience of sounds, to be actually linguistic, requires a specific phonological structure and a degree of organization deeper than the one provided by phonological structure alone. Carefully discussing this point will be the core part of the next section.

Some hypotheses to reinforce ILTC

We are now able to provide some emendations for ILTC, in order to avoid the problems described in the previous section and, presumably, many others. We mentioned that, for what concerns the epiphenomenalist disposition of ILTC, a possible solution might emerge from a deep reconsideration of the role of consciousness and its relationship with attention. Jackendoff says that attention is something that works "inside" consciousness with the function of selecting which elements to process with richer detail. We agree that its basic function is to select representations, but we think that it plays a much more relevant role for consciousness.[35]

According to the computational hypotheses, there is a stream of information that reaches the brain through sensory receptors. This information is at first processed and converted into low-level disorganized representations. After further processing, more detailed representations are construed. This conception of the computational flow is a form of bottom-up account, to indicate metaphorically that it runs from the environment to the brain. As we have seen, there is empirical support for a complete bottom-up elaboration without the arising of consciousness,[36] as, for example, in subliminal perception.

According to our hypothesis, for consciousness to emerge a different kind of brain processes must be involved. We can imagine a counterstream of processes proactively applied like a filter on the representations that are being built by the bottom-up flow;[37] this filter selects the representations that are to become conscious. Since those processes are derived from within the brain and they work on the information acquired from the external environment, they are called "top-down". Attention is typically considered as a twofold process.

On the one hand a more salient stimulus can automatically capture attention, in this case we talk about stimulus-driven (or bottom-up) attention, selective attention, on the other hand is a voluntary top-down process. Prinz claims that it is this process and only this one what makes representations conscious by making them available for (posterior) working memory encoding.[38] We don't discuss whether attention is the only one, the main, or just one of the processes involved, but we hold that some kind of top-down intervention is required for consciousness to arise. Moreover, it is plausible that top-down elaboration modifies the phenomenal character[39] of the representations it selects on the basis of, for example, previous experience, expectations and associative background knowledge.[40]

From this perspective we can identify a conscious stage in the stream of neural computations, which corresponds to the interaction of top-down and bottom-up and ends with the beginning of specifically high-level elaborations, such as conceptualization and long-term memory storage. At this stage all the elements that determine consciousness are working together in real time. The flow

of bottom-up information is continuous and so is top-down selection.[41] According to this view, consciousness is to be considered neither as a byproduct, nor as an amplifying lens, but as a critical and necessary step in the flow of computations, which allows for on-line selection and modification of salient representations, thus affecting determinant factors like quick reactions, judgments, choices, preferences etc. Hence, epiphenomenalism should be ruled out once and for all.

In line with this proposal, we believe that a form of top-down selection must be at work in linguistic conscious experience as well. To spell out this idea we fist have to clearly differentiate a general auditory experience from a specifically linguistic one. At a first approximation, we can consider the latter as a particular kind of the former. More precisely, auditory processing, like visual processing, runs from a low-level disorganized array of stimulus related features, to a high-level abstract conceptual model. The intermediatelevel of processing will then correspond to a set of representations that vary with, for example, the orientation of the hearer but still involve consistent organized patterns. In the case of linguistic experience, these patterns reflect the particular organization that constitutes the phonological structure of a given natural language.

Hence, following Jackendoff, we hold that the phonological structure corresponds to the intermediate level at which representations serve as a basis for language consciousness. However, we must also account for the necessary top-down processes responsible of selecting these auditory intermediate level representations. Even if we don't know exactly how to characterize this processes. We can see that, whatever they may be, the top-down processes that are at play during normal auditory experience cannot be the same as those involved in linguistic recognition. The main reason behind this idea is the one following: if the process responsible to select intermediate level representations of simple auditory and linguistic experience were to be the same, this process would not be able differentiate, phonological intermediate level representations from normal sound representation of the same kind. This is evident in the case of a person that hears two people speaking a foreign language. In this case only the top-down selection process for general auditory intermediate level representation is active and he experiences the given language as a stream of sounds.

Moreover, the relevant feature that makes an auditory experience a fully linguistic one cannot be a part of the representational content itself. In favor of this last claim one could say that the subject is aware of hearing a language from the way it sounds and because it is uttered by a human being, even though he doesn't understand it. As we sketched out above, we think that this account is not adequate and the reason is that the two foreign speakers could actually not be speaking at all. They could be producing a series of arbitrary language-like noises that are completely unrelated to each other. It follows that the relevant phonological representa-tions have to be effectively conscious in a specifically linguistic way that is distinctively different from mere auditory experience of the same sounds.

Thus, we hold, a specific selection device is needed, which enables the cognitive system to distinguish between representations corresponding to appropriate streams of language from streams of language containing errors and from arbitrary streams of phonemes or phoneme-like sounds, that may not be regarded as linguistic at all.[42] Since the semantic structure is excluded from the domain of consciousness for the reasons provided above, we propose that the more suitable candidate for this function is the syntactic structure.

Once the compound of syntactic rules of a language has been acquired at a sufficient degree, the brain can map a consistent interface between intermediate phonological representations and semantic/conceptual

structure. Only when this condition is satisfied a subject can be considered to be having a fully conscious linguistic experience.[43]

This perspective preserves the possibility of an innate characterization of a deep syntactic structure, like Chomsky has reasserted in many of his works.[44] It is interesting to note that an innate characterization of a deep syntactic structure is plausible in the case of the acquisition of the first language, insofar it may well be possible that an infant won't entertain any properly linguistic conscious experience until she is able to build some syntactically consistent sentences. This basic syntax has not to be very complex; it has to be only organized enough as to distinguish whether some uttered or perceived stream of (linguistic) sounds corresponds to a (linguistic) well-formed formula. We can now recover Jackendoff's account and propose that a subject cannot rely on linguistic privileged access to his own thoughts until she has developed a sufficient syntactic competence. Such a condition works for children while learning their mother tongue as well as for adults trying to acquire another language[45].

Conclusive remarks

This paper is mainly constituted by a review of ILTC. We hold that, even after the recent re-elaboration by Jesse Prinz, there still needs some modifications in order to not be exposed to powerful objections, especially in the case of linguistic experience. To summarize, we have proposed a hypothesis according to which consciousness constitutes the necessary computational stage in which intermediate level representations are linked with high-level structures and processes and rendered suitable for long term encoding (as well as other high-level operations). Consciousness arises when specific top-down selection processes are at work on intermediate level representations; the proposed top-down structure required for the possibility of lin-guistic consciousness is syntax. Each modality of consciousness offers a particular access to unconscious thought processes nested in depth. In particular, conscious linguistic access to thoughts (which is specific for each natural language) is possible when syntax has been characterized to a sufficient degree so to build and recognize a sentence as a well-formed formula.

This approach to consciousness, which is to be ascribed to the original idea of Jackendoff, has a twofold advantage. From one point of view it makes consciousness modality specific: it reckons several conscious dimensions, as many as the sensory channels interfaced with the cognitive system, endowed with similar operational principles. From another point of view it takes into account the phenomenal experience of language making of it a complementary element for the syntactic apparatus; and it makes of the syntactic structure a necessary condition for the experience of language, opposing a somewhat traditional view that conceives of syntax as incompatible, or, at best, alien to conscious experience. More precisely, syntax provides the subject with the capability to distinguish auditory experiences in general from the specifically linguistic ones.

A rather compelling consequence that stems from our proposal and might be interesting to inquire further is the following: if the external linguistic stimuli were to be insufficient, or the deep brain structures of syntax were to be damaged and/or hindered, linguistic consciousness would never arise. This consideration provides a testable prediction that can be addressed by future empirical investigation.

Notes

[1] Although this paper has been effectively co-written by the authors, we may claim that the introduction, the conclusion and §§ 4 and 5 are to be ascribed to Giacomo Romano; the remaining paragraphs have to be attributed to Francesco Marchi.

[2] The two types of processes correspond broadly to the distinction between Access-consciousness

and Phenomenal-consciousness introduced by Ned Block. The main interest of the ILTC is to provide a model for the second type of conscious processes, the *what-it's-like*, differentiated from, for example, abstract thought processes etc.

[3] See R. JACKENDOFF, *Consciousness and the Computational Mind*, MIT Press, Cambridge (MA) 1987, p. 16.

[4] See *ivi*, p. 23.

[5] Although the present paper is focussed on linguistic experience, following Jackendoff and Prinz, we carefully discuss visual experience as a particularly strong case for applying the ILTC approach.

[6] According to Jackendoff's theory, the entailment is valid at the high-level, where the information processed in each modality is bound together in an object centered 3D representation. The 3D model is abstract and includes amodal information that was previously modally elaborated in each separate modality.

[7] It is important to note that Jackendoff recognized the necessity of some kind of top down intervention, in order to select which intermediate level representations are to be conscious, but his discussion of such aspects of the theory are not as clear and compelling as his intuitions about the intermediate level, so we prefer to discuss the problem later and in a different form.

[8] In particular, Jackendoff adopted the contemporary tripartite model developed by David Marr in his *Vision.* We don't discuss Marr's model here, but it's important to note that it provided Jackendoff with the computational structure to characterize, at least for vision, the three levels that are the core components of ILTC.

[9] Prinz's characterization of the visual system is not specifically related to alternative theories of vision (see J.J. PRINZ, *The Conscious Brain*, Oxford University Press, Oxford 2012, p. 44). However, he discusses the important proposal by Milner and Goodale for the relationship between consciousness and action (see A.D. MILNER, M.A. GOODALE, *The Visual Brain in Action*, Oxford University Press, Oxford 1995, pp. 188-189). We will not discuss here this part of his theory. For the present purpose be it enough to say that, since the "dorsal stream" posited by Milner and Goodale is associated with unconscious motor control, the relevant areas involved in visual conscious experience are, broadly, those associated with the "ventral stream".

[10] See J.J. PRINZ, *The Intermediate Level Theory of Consciousness*, in: M. VELMANS, S. SCHNEIDER (ed.), *The Blackwell Companion to Consciousness*, Blackwell, Moldem-Oxford 2007, pp. 247-250, here p. 249.

[11] With respect to their collocation in the series.

[12] For detailed reference to this data see J.J. PRINZ, *The Intermediate Level Theory of Consciousness*, cit., pp. 249-250.

[13] See H. BRIDGE, S. HAROLD, E.A. HOLMES, M. STOKES, C. KENNARD, *Vivid Visual Mental Imagery in the Absence of the Primary Visual Cortex*, in: «Journal of Neurology», vol. CCLIX, n. 6, 2011, pp. 1062-1070.

[14] See M.J. FARAH, *Visual Agnosia: Disorders of Object Recognition and What They Tell Us About Normal Vision*, MIT Press, Cambridge (MA) 1990.

[15] See M.J. FARAH, *The Cognitive Neuroscience of Vision*, Oxford University Press, Oxford 2000.

[16] Also due to the fact that it is the most studied and well known of all modalities.

[17] See S. DEBNER, C.S. HERRMANN, C. KRANCZIOCH, D. GEMBRIS, A.K. ENGEL, *Top-Down attentional Processing Anhances Auditory Evoked Gamma Band Activity*, in: «Cognitive Neuroscience and Neuropsychology», vol. XIV, n. 5, 2003, pp. 683-686, for an example of top-down modulation from high level areas onto lower-level ones in the case of hearing.

[18] See R.W. KENTRIDGE, T.C.W. NIJBOER, C.A. HEYWOOD, *Attended but Unseen: Visual Attention is not Sufficient for Visual Awareness*, in: «Neuropsychologia», vol. XLVI, n. 3, 2007, pp. 864-869.

[19] See D. SIMONS, C. CHABRIS, *Gorillas in Our Midst: Sustained Inattentional Blindness for Dynamic Events*, in: «Perception», vol. XXVIII, n. , 1999, pp. 1059-1074; P.J. HSIEH, J.T. COLAS, N. KANWISHER, *Pop-out Without Awareness: Unseen Feature Singletons Capture Attention Only When Top-Down Attention is Available*, in: «Psychological Science», vol. XXII, n. , 2011, pp. 1220-1226.

[20] According to Jackendoff every high level cognitive process has no phenomenal counterpart, i.e. there is no cognitive phenomenology. In order to be consciously experienced, the output of such processes must be first converted into a sentence that can be uttered in an inner speech.

[21] See R. JACKENDOFF, *How Language Helps Us to Think*, in: «Pragmatics and Cognition», vol. IV, n. 1, 1996, pp. 1-34, here p. 24 and more clearly p. 29.

[22] See R. JACKENDOFF, *Language, Consciousness, Culture. Essays on Mental Structure*, MIT Press, Cambridge (MA) 2007, his most recent detailed review of his own work, p. 82-83.
[23] See *ivi*, p. 99.
[24] The problem of how representations of different modalities are bound together and integrated into a coherent multimodal picture is not a concern of this paper. However, we can point to the fact that although the intermediate level representations are modality specific, the intermediate level itself, as a functional construct, could be considered as a workspace shared by all the different modalities.
[25] For more detailed commentaries on Jackendoff see R.D. ELLIS, *Ray Jackendoff's Phenomenology of Language as a Refutation of the "Appendage" Theory of Consciousness*, in: «Pragmatics and Cognition», vol. IV, n. 1, 1996, pp. 125-137; W. CHAFE, *Comments on Jackendoff, Nuyts, and Allwood*, in: «Pragmatics and Cognition», vol. IV, n. 1, 1996, pp. 181-196; J. BARNDEN, *Unconscious Gaps in Jackendoff's "How Language Helps Us to Think?"*, in: «Pragmatics and Cognition», vol. IV, n. 1, 1996, pp. 65-80; H. DUFVA, M. LÄHTEENMÄKI, *But Who Killed Harry? A Dialogical Approach to Language and Consciousness*, in: «Pragmatics and Cognition», vol. IV, n. 1, 1996, pp. 105-112.
[26] See R.D. ELLIS, *Ray Jackendoff's Phenomenology of Language as a Refutation of the "Appendage" Theory of Consciousness*, cit.
[27] See J. BARNDEN, *Unconscious Gaps in Jackendoff's "How Language Helps Us to Think?"*, cit.
[28] The question is addressed by H. DUFVA, M. LÄHTEENMÄKI, *But Who Killed Harry? A Dialogical Approach to Language and Consciousness*, cit.
[29] See J. BARNDEN, *Unconscious Gaps in Jackendoff's "How Language Helps Us to Think?"*, cit.
[30] This notation is used only to underline an hypothetical non-linguistic form of the relation in question.
[31] For example, Susanna Siegel discusses the visual experience of causation, where causation can be considered in the present Framework as a high-level thought relation. See S. SIEGEL, *The Visual Experience of Causation*, in: «Philosophical Quarterly», vol. LIX, n. 236, 2009, pp. 519-540.
[32] See R. JACKENDOFF, *How Language Helps Us to Think?*, cit., p. 11.
[33]See R. JACKENDOFF, *Language, Consciousness, Culture*, cit., p. 82.
[34] A similar point is made by Galen Strawson (see G. STRAWSON, *Mental Reality*, MIT Press, Cambridge (MA) 1994) and endorsed by Terence Horgan and John Tienson (see T. HORGAN, J. TIENSON, *The Intentionality of Phenomenology and the Phenomenology of Intentionality*, in: D.J. CHALMERS (ed.), *Philosophy of Mind. Classical and Contemporary Readings*, Oxford University Press, Oxford 2002, pp. 520-533). As we said, we do not go as far as these authors and claim that there is a distinct semantic phenomenology of "Understanding". We hold that the phenomenal distinction resides at a previous level and it's connected to the capability to distinguish organized linguistic structures from disorganized sound.
[35] To a wide extent, according to the proposal of Jesse Prinz.
[36] See also S. DEAHENE, J.P. CHANGEAUX, L. NACCACHE, J. SACKUR, C. SERGENT, *Conscious, Preconscious and Subliminal Processing: A Testable Taxonomy*, in: «Trends in Cognitive Science», vol. X, n. 5, 2006, pp. 204-211; J.J. PRINZ, *The Conscious Brain*, cit.
[37] For the theory of the proactive brain and the discussion of top-down processes in visual recognition we refer to the work of Moshe Bar and his group, in particular see M. BAR, *The Proactive Brain: Using Analogies and Association to Generate Predictions*, in: «Trends in Cognitive Science», vol. XI, n. 7, 2007, pp. 280-289; M. BAR, *The Proactive Brain: Memory for Predictions*, in: «Philosophical Transactions of the Royal Society. B. Biological Sciences», CCCLXIV, n. 1521, 2009, pp. 1235-1243; M. BAR, M. NETA, *The Proactive Brain: Using Rudimentary Information to Make Predictive Judgements*, in: «Journal of Consumer Behaviour», vol. VII, n. 4-5, 2008, pp. 319-330.
[38] The discussion of attention and its necessity and sufficiency for consciousness is one of the most controversial parts of Prinz's theory. The basic idea is that stimulus-driven attention doesn't presuppose conscious experience, on the contrary it enables consciousness, whereas top-down attention can be exerted on a consciously perceived stimulus to focus on subtle aspects of it and bring to consciousness previously unnoticed features. Indeed, Prinz's theory is itself problematic and we demand its discussion to a future article.
[39] This idea usually takes the form of a cognitive penetrability thesis, i.e. the idea that high-level processes actively influence the phenomenal

character of experience. For a recent discussion of the idea see F. MACPHERSON, *Cognitive Penetration of Colour Experience: Rethinking the Issue in Light of an Indirect Mechanism*, in: «Philosophy and Phenomenological Research», vol. LXXXIV, n. 1, 2012, pp. 24-62; S. SIEGEL, *Cognitive Penetrability and Perceptual Justification*, in: «Nous», vol. XLVI, n. 2, 2011, 201-222. There are evidences that the cognitive penetrability thesis might ultimately undermine the very notion of an intermediate level of information processing. Even if this notion will need to be rethought or given up entirely, the present discussion will still be relevant for having highlighted some general aspects of linguistic experience that hold independently from the notion of intermediate level itself.

[40] See M. BAR, *The Proactive Brain: Memory for Predictions*, cit.

[41] If we were to disrupt one of the two computational streams, consciousness should not arise. This is supported by experiments like those on inattentional blindness and sensory deprivation. The first shows that, broadly, there is no conscious perception of a stimulus if attention is deviated on other tasks. The second seems to support the idea that if the brain were forced to make exclusive use of previously stored information, consciousness would be compromised.

[42] Here, we focus on linguistic conscious experience, but the idea can be extended to other modalities as well. The claim is that there is an array of top-down selection processes that could work very similarly to the syntactic structure of language, e.g. a "visual grammar" that follows Gestalt-like principles.

[43] The present discussion is aimed at providing a programmatic set of hypotheses for a reconsideration of the problem of linguistic experience and the role of syntax in an intermediate level framework. We are aware of the sketchy nature of the argument we offer for the latter idea. Nevertheless, we think that it provides some valuable hints on the correct way to go if we are to understand the particular nature of our linguistic conscious experiences.

[44] See i.e. N. CHOMSKY, *Language and Mind*, Cambridge University Press, Cambridge 1972; N. CHOMSKY, *Language and Problems of Knowledge*, MIT Press, Cambridge (MA) 1988.

[45] In this second case access to thought is already possible in the native language.