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Evaluating Auditory Arguments

Gabrijela Kišiček ⒾⒹ et Martin Hinton ⒾⒹ

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Résumé de l'article

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As Syllable from Sound: Evaluating Auditory Arguments

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Abstract: This paper addresses the problem of how to identify and evaluate arguments made in a nonverbal form. Such arguments may employ images, sounds, or a combination of these in a truly multimodal presentation. Here, we concentrate on those which are classified as auditory, i.e. contain at least one premise or the conclusion in sound form. We propose and test a solution whereby some elements of the Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) are modified to allow for the evaluation of auditory arguments. The results of this approach are illustrated with the help of a number of authentic examples.

Résumé: Cet article aborde le problème de la façon d'identifier et d'évaluer les arguments présentés sous une forme non verbale. De tels arguments peuvent utiliser des images, des sons ou une combinaison de ceux-ci dans une présentation véritablement multimodale. Ici, nous nous concentrons sur les arguments classés comme auditifs, c'est-à-dire qui contiennent au moins une prémisse ou la conclusion sous forme sonore. Nous proposons et testons une solution dans laquelle certains éléments de la procédure d'évaluation globale de l'argumentation naturelle (CAPNA) sont modifiés pour permettre l'évaluation des arguments auditifs. Les résultats de cette approche sont illustrés à l'aide de nombreux exemples authentiques.

Keywords: auditory argument, argument evaluation, multimodality, CAPNA

1. Introduction

The urge to evaluate arguments is an instinct. No sooner do we hear the expression of an inference, the leap from the acknowledgement of one thing to the acceptance of another, than our minds are racing to decide if the leap was well judged and the speaker has landed on solid ground or instead has dropped short and is plunging into that pit of reasoning error, the endless fall of the fallacious. It is second nature to us to conduct our analysis of these inferences via a close and thorough examination of the language used: its scope, its tone, its nuance, its implication. How, then, should we react when the reasoning we are confronted with

is set forth not in words but in the form of other auditory stimuli: when we must heft not syllables but sounds?

In this paper we first describe what we understand auditory arguments to be, providing a typology based on the origin of the sound itself, and the role of the auditory element in the argument structure. We consider how this relates to verbally based mainstream argumentation theories and their methods of argument identification, classification, and schematisation. We then discuss various problems which may be thought to arise in the evaluation of auditory arguments, weighing the advantages of reductionist and non-reductionist approaches, and addressing the lack of evaluative frameworks for nonverbal argumentation.

The subsequent sections of the paper proceed to offer a suggestion as to how a properly procedural and theoretically justified evaluation system for auditory arguments can be constructed through appropriate modification of the Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) (Hinton, 2021). We show how the CAPNA can be adjusted to support a non-reductionist analysis and evaluation of auditory arguments by the addition of relevant procedural questions at the stages of Reasoning and Expression analysis. The modified procedure is then employed to produce evaluations of three example arguments. These evaluations illustrate the range and flexibility of the CAPNA, and also highlight areas requiring further study and consideration. After a discussion of the efficacy of the process and the avenues for improvement, we conclude that the method of evaluation we have outlined provides a promising basis from which to expand and develop tools for analysing nonverbal argument expressions.

2. Multimodal and auditory arguments

In this section, we consider earlier work on arguments presented in a nonverbal mode, and, in particular, on auditory arguments. We define an auditory argument as **any argument which employs elements of sound to express or support its inference**. We go on to set out a typology of sounds which may occur in arguments and to discuss how their identification may affect the evaluation process. We also discuss the various argument types in which sounds may play a role and the problem of type identification.

2.1 Research on multimodality

Communication today is possible using many different platforms, media and tools which are at our disposal, and, not surprisingly, this is reflected in contemporary argumentation in public discourse. Advertisements, political campaigns, science communication and even judicial discourse, use not only words but also visual images, sounds and other nonverbal modes to build an argument. Therefore, argumentative discourse today is often multimodal. Groarke (2015, p. 140) defines modes in terms of the ingredients (the 'material', the 'stuff') an arguer uses and arranges when they engage in an act of arguing. Drawing an analogy between constructing an argument and constructing a building, Groarke (2015, p. 134) aims at "expanding the realm of argumentation theory to arguing that depends, not only on visual images, but on sounds, tastes, music, smells, tactile sensations and other non-verbal phenomena that arguers often use in their attempts to provide support for their conclusions."

For a long time, argumentation has been seen as verbal activity and other modes of arguing have been unjustifiably ignored. However, in the last few decades multimodal argumentation has gained more attention. At the same time, it has also gained critics who believe that images, for instance, can be a powerful means of persuasion, and even more, manipulation, but that they cannot argue. That view notwithstanding, the greatest progress in expanding the realm of argumentation has been in the scope of visual argumentation. Since the pioneering work of Birdsell and Groarke (1996), many authors have argued that images can be legitimate arguments in a world where visuals play an increasingly important role in everyday communication (Lake and Pickering 1998; Ripley 2008; Alcolea-Banegas 2009; Van den Hoven 2012; Dove 2013; Blair 2015; Godden 2015; Kjeldsen 2015; Roque 2015; Tseronis 2021, etc.)

Although the disputes between proponents and opponents of visual argumentation are still not completely resolved (Champagne and Pietarinen 2019), images are now considered to be a less controversial topic in argumentation theory. Moreover, the acceptance of visual argumentation has opened the door to the examination of the other modes of arguing.

Mejia (2020) examines the role of taste in argumentation. Well aware that everyday argumentation often appeals to one's experience, Mejia wanted to explore whether tastes could be considered as a part of argument construction. Facing the biggest challenge - the impossibility of expressing the taste propositionally - Mejia reconsiders the concepts of reconstructions and definitions of argumentation. Godden (2015, p. 235) addresses the same problem, calling it 'the oldest and most basic question of the interpretative research in visual argumentation - the question of propositionality". Kjeldsen (2015, p. 115) goes a step further and asks questions about these questions: Must it be propositional to be argumentation at all? What difference does the difference make?

Several scholars have examined the role of sound in an argumentative discourse asking questions about the possibility of auditory argument (Kišiček 2014, 2016, 2018, 2019, 2020; Groarke and Kišiček 2016, 2018; Groarke 2018; Eckstein 2017, 2018; Kjeldsen 2018). Kišiček (2014, 2016) explores the role of prosodic (or paralinguistic) features of spoken language in argumentation. Based mostly on advertisements as a genre and the importance of voice quality, intonation, tempo, pauses, etc. of voiceovers, she concludes that in some instances prosodic features contribute to the strength of an argument presented verbally. However, in some examples, the prosodic feature itself (e.g. a specific accent) is an essential part of an argument's construction.

Eckstein (2017) explores sounds which might have significance in an argumentative discourse differentiating between "sound objects" and "soundscapes" and explaining sound objects as specific sounds which are used for attracting attention (e.g. different alarms, sirens, drum rolls etc.) while soundscapes are described as a sonic background inherent for a specific time or place.

Groarke (2018, p. 313) examines the logic of "sound" arguments, defining auditory arguments "as an attempt to provide rational evidence for a conclusion using non-verbal sounds instead of, or (more frequently) in addition to, words." Further on, Groarke (p. 326) believes that both verbal and auditory arguments can be analysed and evaluated in the same way as verbal ones: "by depicting them in ways that use the diagramming techniques used to depict the structure of verbal arguments." However, the main problem which frequently occurs in the evaluation of multimodal arguments (both visual and auditory) is the translation of images or sounds into words, a reductionist approach. In

his response to Groarke, Eckstein (2018, p. 344) discusses the issue of reducing sound to a cause which he considers problematic because "an exclusively causal approach to sound studies is overly limiting. What is needed is an additional way to problematize sound, not only as a cause, but also as representation".

Kišiček (2019) attempts to reconstruct and evaluate auditory arguments by borrowing tools from verbal argumentation and applying critical questions for specific argument schemes (argument from sign, argument from consequence, argument from cause to effect) to auditory arguments. However, since the critical questions were intended for verbal arguments, they did not cover all the specificity of sounds. For instance, it was shown in several examples in the paper that auditory arguments frequently function as arguments from sign: we hear something and draw a conclusion. Yet, Walton et al. (2008, p. 329) characterise the "specific premise" as: "A (a finding) is true in this situation" which represents a jump from the sign itself to a proposition about the finding drawn from it. The suggested critical questions - What is the strength of correlation of the sign and the event signified? Are there other events that would more reliably account for the sign? – pay no regard to the sign itself and clearly do not exhaust all the possible questions about the nature of sound as a sign and its relation to the specific event. Sounds may often be unclear, it may be difficult to recognize the source of the sound and its authenticity, and after applying these critical questions, it was obvious that not all angles of argument evaluation were covered. The approach of Walton et al. is a somewhat reactionary reductionism, which assumes that any sign, in any mode of presentation, can be at once reduced to a truth value.

The complexity of interpretation is especially clear in cases where several sounds work together as a support for one conclusion. Kišiček (2019) discusses examples of domestic violence in which one might conclude that it is necessary to call the police based on sounds coming from a neighbour's house. This turned out to be a difficult task because different sounds which might appear should be tested for their coherence. Different combinations of sound can lead to completely different conclusions. This was only one example in which it became clear that the established critical questions, regardless of their applicability to the different modes of arguing, do not completely satisfy the complexity of auditory arguments.

Some form of non-reductionist analysis of auditory arguments which takes special notice of the nature of sounds themselves, without reducing them at once to propositions in language, is clearly necessary. As Groarke (2019) points out, in the process of translation, something inevitably gets lost because words cannot capture the exact content of an image or sound. Groarke (2019, p. 342) proposes the ART model for visual (but also multimodal) argument analysis. An ART analysis of an argument consists of two parts: a "Key Component" (KC) table which identifies the argument's premises and conclusions; and an argument diagram that depicts its structure.

However, Groarke's ART method, regardless of its contribution to the process of identifying and analysing multimodal arguments, provides tools only for description and not for evaluation. In this paper, we want to investigate whether evaluation systems designed with verbal argumentation in mind can be adapted for auditory arguments, rather than auditory arguments being adapted to fit such systems. The ART system of analysis could certainly be used in conjunction with the evaluation tool described in Section 3 below, and we hope to do that in a future study.

2.2 A typology of sounds in arguments

The category 'sound' is very broad. As a first step towards an evaluation procedure, here, we suggest a typology of sounds which will be helpful in assessing arguments which make use of auditory input. We draw distinctions based upon the source of the sound and whether it is employed in the argument as a distinct occurrence, indexed in time and place, or as a generic representative or symbol.

While different types of sounds may occur from time to time, the sound which is continuously present in human communication is the human voice i.e. prosodic features of speech. Nonverbal aspects of vocal communication go well beyond the message of the language itself because they "not only accentuate or complete the meaning of words, but they can also modify, modulate, or change the interpretation of words" (Friedman 1982, p. 51).

Vocalic (or prosodic) aspects of nonverbal communication which include voice quality, pitch, intonation, tempo, loudness, rhythm, accent etc. have been extensively researched in respect of their influence on expressing emotions (Pell et al. 2009, Elfenbein and Ambady 2002,

Banse and Scherer 1996, Scherer 1986), interpersonal relationships (Norton-Ford and Hogan 1980, Rezlescu et. al. 2015, Bar et al. 2006), cultural differences (Sauter et al. 2010, Scherer, 1972), persuasiveness of the speaker (Aronovitch 1976, McAleer et al. 2014), and also their role in an argumentative discourse (Kišiček 2016, Groarke 2018).

A wide body of empirical research in the realm of nonverbal communication has provided us with evidence that both speakers and listeners transmit and receive nonverbal messages using prosodic cues. For instance, one recent study (Sorokowski et al. 2019) has shown that professionals, both male and female, when asked to give an expert opinion and present from a position of authority deliberately lower their pitch (fundamental and formant frequencies) and that listeners judge speakers with lower pitch as more competent and credible. This confirmed previous studies that men with relatively lower voice pitch and perhaps lower formants are often also judged as more attractive compared to men with relatively higher voice frequencies (Sorokowski et al. 2019). In a professional context, both men and women with relatively low voice frequencies are typically judged as more dominant and competent (see e.g., Klofstad et al. 2012). Thus, a low-frequency voice may benefit men in a broad range of social contexts ranging from the sexual to the political and the economic. Also, it is well-known that people manipulate their voices when taking a position of authority. For example, former British Prime Minister, Margaret Thatcher, reportedly lowered her voice pitch when delivering political speeches (Karpf 2006). Another study conducted several decades ago empirically tested and showed that people with more confidence tend to speak more loudly (Kimble and Seidel 1991).

Further, research suggests that highly nasal voices are judged as undesirable in public discourse. Bloom, Zajac and Titus (1999, p. 279) concluded that highly nasal voices were rated as being lower in "status" (occupation, ambitious, intelligent, educated, influential), lower in social solidarity (friendly, sympathetic, likeable, trustworthy, helpful), and were negatively correlated with perceptions of persuasiveness.

The sound of the human voice is constantly present in social interactions and may have a significant role in an argumentative discourse. However, since the manner of speech is strongly connected to the content of speech, it is not always easy to delimit between the verbal and nonverbal parts of an argument.

Besides prosodic features, humans also produce sounds which are independent of any verbal message and include laughing, crying, yawning, sobbing, sighing, etc. All these sounds carry information on their own, most commonly about the emotional state of the speaker; but there are also different sounds which may signal agreement or disagreement with what is being said, and, therefore, may also play a part in persuasion or argumentation processes.

Apart from the human sounds which surround us continuously in social interactions, we may encounter different non-human sounds, for instance, animal sounds or other natural sounds like waterfalls, rain drops, river flows, wave crashes, etc. These natural sounds exist regardless of our communication process and can be unnoticeable and without any effect on social interaction.

However, in some communicative situations they may be deliberately and intentionally used for different purposes. For example, sounds of waterfalls, waves, birds, and different animals may feature in promotional videos for exotic travel destinations, or be used for the purpose of creating a specific atmosphere.

Finally, the second type of non-human sounds are artificial sounds created by human activity, but not the human body directly: alarms, sirens, engines, musical instruments, etc. These sounds also surround us on a daily basis and can have an impact on communication (e.g. traffic noise which disturbs communication, music which creates a desired mood).
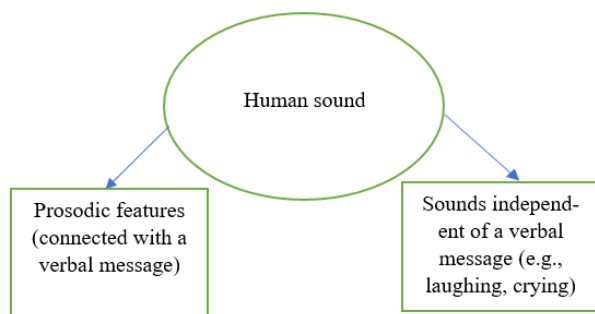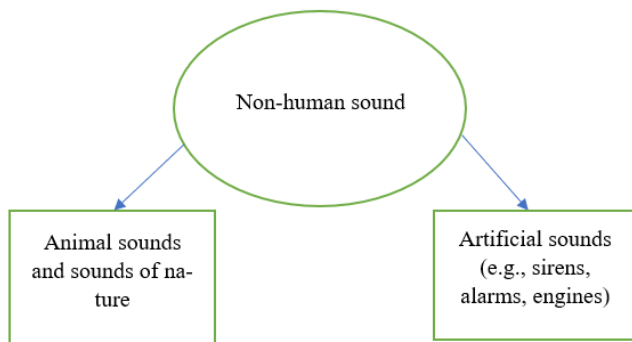
Figure. 1 Typology of sounds

A second important distinction is between sounds which are indexed in time and space, and linked to a particular event or source, and those which are generic and intended to reference a type of event. For example, one might put together a sequence of sounds such as clinking glasses, followed by crashing metal, followed by a funeral march, to persuade drivers not to drink alcohol. In this case, all three sounds would be generic, not supposed to refer to any particular occasion, but familiar and meaningful nonetheless.

By placing the auditory components of an argument into these categories, we learn a lot about the types of questions we need to ask in an evaluation. Clearly, questions over origin are not applicable to generic sounds, while the four types of sound illustrated in Figure 1. each carry with them different expectations and applications. There is a huge amount of research into the identification and meaning of prosodic features, for instance, while experts may be able to tell the difference between the engine noise of different models of car. These factors will influence both the acceptability of an auditory element of an argument and its inferential role.

2.3 Sounds and argument type

There are two important questions to consider concerning argument types and auditory argument: firstly, what types of argument can feature elements of sound, and, secondly, how can we identify argument types within that range? As a preliminary to any discussion of argument types, however, we should establish what we mean by that term and whence we shall take a list of possibilities.

A recent innovation in argumentation theory, the Periodic Table of Arguments[1], created by Jean Wagemans (2016) can be of great assistance at this point. Whilst there are many lists of different argument names, these often contain some confusion by including names associated with fallacies, or, like the collection of argument schemes in Walton, Reed, & Macagno (2008), lack a clear rationale for their structure. The Wagemans system, on the other hand, is systematic and procedural, and, crucially, entirely descriptive with no conflation of evaluative terms. Arguments are placed in the table on the basis of their linguistic structure – to which we shall return – and the nature of their conclusion and data premise. These are categorised as being statements of fact, policy, or value. Thus, an argument type is a unique combination of a form and a pair of statement types. These are further subdivided into 'isotopes' depending on the nature of the 'lever' premise, or warrant.

Since the auditory part of an argumentative structure can play the role of a factual statement in a verbal argument form, be it a premise or a conclusion, any argument type which employs facts can equally well employ sounds. So, while we are inclined to believe that all forms of argument could be constructed with auditory input, we concentrate here on those types which are identified as having a factual statement in the data or conclusion.

In the table, one group of common argument types is formed from those which assert a fact on the basis of another fact. These include arguments from cause, effect, and correlation; as well as, perhaps most importantly for auditory arguments, arguments from sign. This group also contains various forms of argument from analogy, such as from example, genus, or similarity. Other important groups are those from various forms of opinion (from authority, *ad populum*) and arguments from good or bad consequences.

It is not difficult to create toy examples of auditory arguments in each of these forms, and once one begins, an interesting point becomes apparent: in many cases the auditory form is primary to the verbal. In any argument depending on oral testimony, for instance, the data premise 'the witness said he saw the accused' is simply a propositionalisa-

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[1] See https://periodic-table-of-arguments.org/ for a full explanation and the latest developments.

tion of the original sound of the witness's speech. Imagine too an argument from sign where we conclude that our supper is ready on the basis of the fact that 'the sausages sizzled'. This is a weak and rather unsatisfactory verbalisation of the true sign, the sound of the sizzling. Auditory arguments are not, then, exotic or trivial, they are a common basis for verbalised reasoning.

A lot more could be said about how sound input works on various argument types and, indeed, about the Periodic Table itself. Using the Wagemans system, though, has some clear advantages. It gives us a way to identify argument types on the basis of the role that the sound plays in the argument, and draws us towards certain types which are known to feature factual statements, easily replaced by sounds. The analyst can then make a judgement on the type of lever being employed and identify the type within the table. This identification can be used to find an appropriate argument scheme and critical questions with which to test the argument. The obvious concern, that the table is constructed with regard to the linguistic structure to the argument type, is not, in fact, a problem, since the positioning within the table of an argument type is a theoretical concern of little importance in the application, and, in any case, one could put the auditory argument into propositional form in order to check the type of reasoning if necessary, before converting it back to its original form for the evaluation. In order to overcome the inadequacy of argument schemes for dealing with multimodal arguments, an evaluation procedure which specifically focuses on the expression of the premises will be required.

3. Auditory arguments and the CAPNA

The Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) is a system of analysis and evaluation for arguments which is designed to take into account as many elements of the argumentative situation and content as possible, thus allowing a full and thorough examination of the acceptability of the argumentation under consideration. The CAPNA was originally outlined in a monograph (Hinton 2021) which placed particular emphasis on analysing the language of arguments. The system has since been developed and utilised in further studies (Hinton and Wagemans 2022, 2023; Hinton 2024), but has not,

to our knowledge, been employed in the evaluation of nonverbal arguments. Some degree of adaptation and modification of the system is, therefore, likely to be required.

In spite of this, we consider the CAPNA to be an appropriate system upon which to base our auditory argument evaluation for two main reasons. Firstly, the CAPNA is built on a theoretical basis informed by argument norms from all the main areas of argumentation research (see Zenker et al 2024); it looks to operationalise the principles of argument acceptability set out in different approaches rather than to overturn them and put in place new theories of what makes an argument good or bad (Hinton 2021, Ch. 10). This makes it a system without inherent theoretical restrictions, which can be used by advocates of various strands of argumentation research and means that evaluators can focus on particular elements of the assessment procedure and place less emphasis on others, as they wish. This is important to us because we are interested in studying arguments expressed in a certain way, and do not wish at the same time to align ourselves with any particular movement within the field or any particular set of norms.

Secondly, the CAPNA is a clearly defined procedure with discrete steps. This means that the assessments are systematic and repeatable, and that the resulting evaluations are explicit and explainable. It also means that the system is relatively easy to modify: new steps can be introduced and existing ones altered without threatening the coherence of the overall framework. Indeed, the very structure of the procedure invites such modification and thus provides the flexibility we seek in opening up argument evaluation to the nonverbal.

Here, we shall give only a general outline of the CAPNA system, along with a discussion of which areas are in need of adaptation in order to handle nonverbal argumentative structures. The entire framework is developed from a definition of argumentation which attempts to be at once simple and all-embracing: **argumentation is the expression of reasoning within a process**. This allows for both a variety of means of expression and a variety of processes in which the reasoning may be found. It also suggests that a comprehensive assessment of argumentation will require three stages of analysis: of expression, of reasoning, and of process. These three stages, preceded by an initial anal-

ysis stage, form the structure within which are found the various Procedural Questions (PQs) which are used to examine the argument's acceptability (see Figure 2).

It is important to note that the system also sets out a novel conception of the term 'fallacy'. Within the CAPNA, a fallacy is understood as appearing at the moment a PQ cannot be properly answered. The idea of fallacies existing in some way separated from the evaluation process which uncovered them is explicitly rejected: 'arguments are found to be 'fallacious' because they fail at certain points in the assessment procedure' (Hinton & Wagemans 2022, p. 65) and only because of that. Although it is suggested that this is a more coherent approach to fallacies than the widespread, common usage, it is not necessary for evaluators to adopt it in a general way, so long as the meaning of 'fallacy' is understood within the CAPNA environment.
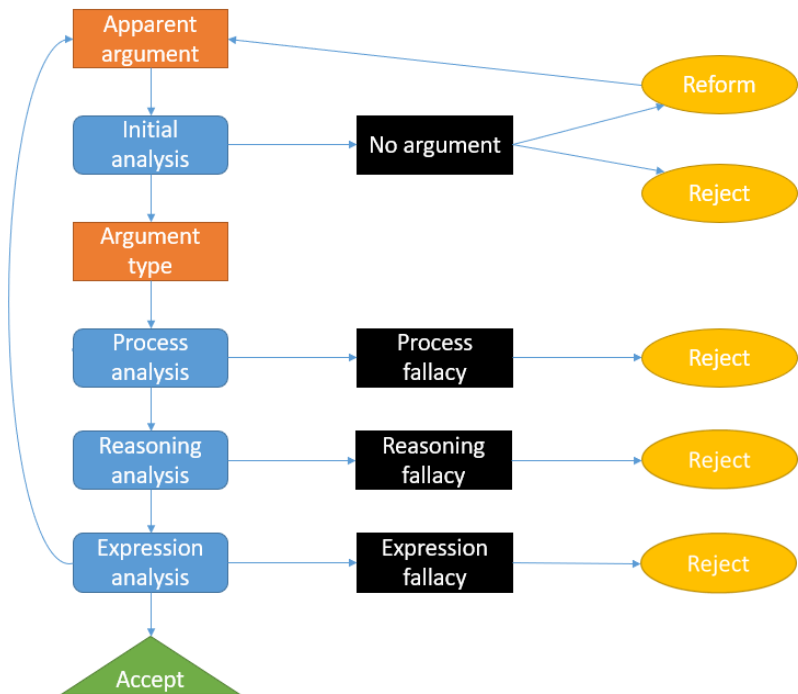

Figure 2: The CAPNA, adapted from Hinton 2021, p. 169

The initial analysis stage encompasses both a first appraisal of the argument and a process of identification. In work on verbal arguments,

this has generally been done through the use of the Argument Type Identification Procedure (ATIP), designed by Jean Wagemans (Wagemans 2023). However, since that procedure relies on linguistic features of premises and conclusions, we are aware that it may not be fully applicable to nonverbal elements of argument. As described above, for the purposes of this paper we restrict our analysis to arguments from sign. Providing a full description of how, and if, the ATIP can be used with multimodal argumentation represents a future research project of its own. Other future projects may employ different ways of describing and identifying arguments, such as Groarke's ART system mentioned above, especially if the ATIP proves to be cumbersome or simply unable to handle some nonverbal arguments. There is no theoretical reason to exclude any form of argument description system from being used in conjunction with the CAPNA, although some small adjustments may be necessary depending on the form of their output.

Once we have an identified argument, we can subject it to the main stages of analysis. At this point, we may choose to assess a particular point of apparent vulnerability at once, or we may follow the stages in the order set out in Figure 2. The first of those is the Process analysis. The PQs posed here are designed to test the argument for five qualities identified in the Informal Argument Pragmatics: Pertinence, Proof (burden of), Productivity, Permissibility, and Politeness. This assessment of the argument's suitability to the process of which it is part is heavily influenced by the 'commandments' of pragma-dialectics, and also takes into account the formal constraints of certain real world environments, such as courts of law. Since there is nothing here tied to verbal argument specifically, there is little to change: it is only necessary to ensure that the term 'expression' is used consistently, where previous versions have sometimes placed 'language'.

The Reasoning stage of the CAPNA has two goals: to check whether the premise is true/acceptable/likely and to assess whether the warrant provides sufficient justification for the inference made to reach the conclusion. Naturally, the discourse situation of which the argument is a part and the use to which it is being put will have an influence over how likely the premise must be and how strong the justification must be for the argument to be considered acceptable. There are two important points to take note of here if these criteria are to be applied to sounds. Firstly, the qualities of truth, acceptability, and likelihood, at least as

they are being used here, apply to propositions, and only to propositions. If we are to make the leap and allow that a premise may be something other than a proposition, then we must also adapt our standard for premise permissibility. We propose adding to the list of characteristics the quality of authenticity. By an "authentic" sound, we mean one which has not been edited or adulterated in order to distort its contribution to the reasoning; one which has not been altered in any way and is not being presented as something other than it is. This applies mainly to recorded sounds which are claimed to represent an actual state of affairs, in the form of a "fact". However, as we stated earlier, we also acknowledge that generic sounds intended to operate symbolically may be used in arguments. In such cases, the quality of being authentic would still apply in the sense that its use would have to be a genuine attempt to evoke what it is claimed to represent and not an attempt to "smuggle" in extra or misleading content in the guise of a simple symbol.

The second consideration is a more practical one: clearly, the way in which the authenticity of a sound could be checked would differ greatly from the methods of fact-checking which might usually be employed. There is no reason to think this is in any way theoretically problematic, however. There exists an industry of the forensic and scientific examination of sounds, whether they be voices, bird song, or the faint traces of an enemy submarine. The degree to which such examination is possible for the casual observer, of course, is another matter and will depend on the nature of the sound being analysed.

An auditory argument, then, may commit a premise or lever fallacy in just the same way as a verbal one. More modification is needed in the case of expression analysis. There are also five aspects of expressions under which arguments are assessed: Clarity, Consistency, Coherence, Completeness, and Concept. Many of the PQs relate specifically to linguistic considerations, but there is no need for these to be removed as they still apply to the other parts of the argument which are not auditory.

A number of the original procedural questions made reference to words and terms, and several were based upon the nature of the construction of meaning by words, yet they remain important in auditory arguments. In the former case, it was generally enough to add the word 'sound', so that, for instance, the PQ on Completeness:

Are there emotional or evaluative terms used?

became

Are there emotional or evaluative terms/sounds used?

In other cases, new questions, analogous to those in the list for verbal arguments, were created. These are listed in Table 1.

Aspect of Expression	Procedural Question
Clarity	Can the sound be heard clearly?
	Can the sound be identified/interpreted clearly enough for the purposes of the argument?
	Could a clearer sound have been used?
	Would a clearer sound have made a difference to the argument?
Coherence	Is the sound input formed of auditively coherent components?

Table 1: New Expression stage Procedural Questions for auditory analysis

4. Example evaluations

In this section we consider several examples of auditory arguments and provide evaluations based on the CAPNA system described above. Our purpose is to show how the adapted procedural questions can be applied and the way in which their answers can assist in the formation of argument acceptability judgements.

There are two important points to make here. Firstly, although we believe that sounds may be used in a variety of argument forms and may play the role of premise or of conclusion, for the purposes of this paper we have restricted our examples to what we can safely characterize as arguments from sign, where the auditory element is a data premise. This choice allows us to avoid, for the time being, the construction of a system of identification of argument type analogous to the Wagemans method utilized by the CAPNA in the analysis of purely verbal

arguments. For now, we proceed with a fixed inference type, and examine varied sound types.

Secondly, in what follows we do not consider questions related to argument process. These questions are unchanged from the original CAPNA form and have been illustrated in earlier publications (Hinton 2021, 2024). More importantly, only the last of the examples was used in a particular instance of arguing and, since it was accepted in that formal process environment, we can assume that no process fallacy was committed. In any case, the emphasis here is on how the evaluation of sound arguments differs from the more usual verbal expressions of reasoning, and the Process stage of evaluation of auditory arguments does not contain any innovations which have not been discussed elsewhere.

4.1 Example #1 – Sounds from space

Believers in extra-terrestrial life claim that there are forms of life outside our own planet. One of the arguments they use to support this claim is based on sounds detected in outer space and recorded by the National Radio Astronomy Observatory. (Shrouded Hand, 2013)[2] The sounds recorded are burbles, buzzes, some sort of screams. These sounds are used in arguments from sign.

We can reconstruct this argument following the scheme of the argument from sign. (Walton, 2006, p. 114)

SPECIFIC PREMISE: A (a finding) is true in this situation
GENERAL PREMISE: B is generally indicated as true when its sign, A is true.
CONCLUSION: B is true in this situation

The auditory argument reconstruction would be:

SPECIFIC PREMISE: Recording 1. (Verbally: Sounds are detected from outer space)
GENERAL PREMISE: Sound is generally produced by some form of life
CONCLUSION: There are forms of life in outer space

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[2] URL: https://www.youtube.com/watch?v=gFO5VFRU5TU&t=21s

We are forewarned about several of the problems which we find with this argument when we attempt to apply the typology of sounds. The claim is that these are non-human sounds, though whether natural or artificial is unclear. Indeed, it is the very source of the sounds which is the crux of the argument which alerts us to the possibility of question-begging.

Reasoning analysis

The procedural questions require that we examine the authenticity of the premise, and the degree to which the inference to the conclusion is justified. In terms of authenticity, this recording provides a good illustration of how this problem is divided into two distinct elements. Is the recording genuine in the sense of undoctored, and is it genuine in the sense of being what it is represented to be? Clearly, these sounds could have been recorded without any manipulation or they could have been specially created. Equally, they could have been recorded by a national observatory monitoring deep space, or they could have been recorded by someone else in a different place. Could these sounds be signs of technical malfunctions of a recording machine? Most importantly, there is no sound in space, meaning that these recordings cannot be of actual sounds, but rather of some detected input rendered in an audible format. As we have no further information in this case, we note that our premise is somewhat unreliable and proceed to the next part of the analysis: the inference strength.

In this argument the general premise is a defeasible correlation between sound and forms of life. It is a weak warrant because sounds do not have to be connected with life, but can occur through other natural processes. Presumably, those publishing these recordings believe that these specific sounds are indicative of life, working on an argument from analogy with human sounds. The inference looks weak, we can continue and analyse the expression element.

Expression Analysis

Applying the Expression stage procedural questions of CAPNA to this argument we recognize problems with Clarity, Coherence and the Concept.

The Clarity questions assess the preciseness with which an identification and interpretation of the sound may be made for the purpose of an argument. The sounds in Recording 1 can be heard clearly, but probably not clearly enough for the purposes of this argument. Is it possible to interpret these recorded sounds in some other way? Could they be signs of non-living forms in outer space. Obviously sounds of burbles and buzzes and screams can be interpreted in many different ways not connected with the argument presented. There is both a fallacy of Clarity here and, potentially, a collapse into a circular argument where we identify unknown sounds as the productions of alien life and use their existence as evidence of that very life. It is a separate issue why certain listeners may want to classify these sounds as evidence of alien life. It might be argued that their very strangeness, their lack of clarity indeed, leads towards that interpretation. That would, however, represent a form of confirmation bias – only those expecting to find alien sounds would categorise unidentifiable sounds as proof of alien activity.

The second question at issue concerns the Coherence of the sounds. The question 'Is the sound input formed of auditively coherent components?' raises serious doubts. Coherence of sound means that different elements of the auditory input lead to the same argument. For instance, varied sounds which indicate a party at our neighbour's house could be laughing, music, lively chatting, singing, etc. Incoherent input in this example would be the added sound of a lawn mower, a shotgun, or building work, which would make us question whether any conclusion could be supported.

Do the sounds of burbles, buzzes and screams present a coherent set, consistent with living forms? No, their variety suggests that those making the argument would present any strange sound as evidence of aliens.

The third problematic question deals with the Concept. The question 'Does the argument attempt to redefine a word/sound for its own purposes?' can be answered in the affirmative, suggesting a fallacy of definition. Here, a series of uncertain sounds is being characterized as representing alien activity because that suits the arguer's standpoint, but without any further support.

We can conclude that this is a weak argument and believers in extraterrestrial life employing it will not make their standpoint acceptable to a wider audience.

4.2 Example #2 – Chicago by night

The second example features a sound recording made public without any explicit argumentative purpose. (LEObear, 2017)[3] However, we can imagine a real-life argument between two partners trying to decide whether to move to Chicago or not. One of them, perhaps, has got a job opportunity and wants to move to Chicago while the other is against it and wants to make an argument for NOT moving to Chicago. She provides an argument in a form of the sound (a recording) of gunshots in the streets of Chicago claiming that it is a dangerous city, and they should not move there.

This example could also be reconstructed as an argument from sign.

SPECIFIC PREMISE: Recording 2. (repeated gunshots in Chicago)
GENERAL PREMISE: Repeated gunshots are a sign of danger
FIRST CONCLUSION: Chicago is a dangerous city
GENERAL PREMISE: We should not move to a dangerous place
FINAL CONCLUSION: We should not move to Chicago

The sounds in this recording are artificial, non-human sounds. In order to play their role in the argument they do need to be convincingly linked to a time and a place.

Reasoning analysis
As noted above, the authenticity of the sound premise is heavily reliant on time and space indexing. Gunshots are not evidence of violence in modern day Chicago if they are not recent recordings from Chicago. We have no further information on this particular case, but clearly to avoid a premise fallacy, a *prima facie* reason for accepting the labelling of the recording would be needed. Some evidence is provided in that this is an example of a multimodal discourse where we see a combination of a visual image (streets at night) and sounds of gunshots.

The strength of the inference is also questionable. Based on the sound it is unclear if this is an isolated incident or repeated event. That changes the argument construction because one incident with firearms does not lead to the conclusion of Chicago being a dangerous city. There may also be non-violent reasons for the shooting, such as a

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[3] URL: https://www.youtube.com/watch?v=URL

nearby firing range. Clearly, the framing and presentation of the sounds is important here. If a listener is primed to expect gunshots in suburbia, that is likely to be their interpretation. Such considerations highlight the need for a full analysis of the rhetorical situation in which the auditor is placed.

Expression analysis

In applying the expression PQs we are again facing a problem of Clarity i.e. the question of whether the sound is precise enough for the purpose of argument. While we do hear a series of distant bangs, we cannot say for certain that they are gunshots, not fireworks, much less that they are being fired in anger, rather than celebration. As such, we may well feel that the argument commits a fallacy of Clarity.

The other PQ at issue in this example is the question of Completeness which deals with emotional implicatures of sound and their significance to an argument. Gunshots are usually connected with war, destruction and death and, therefore, carry emotional value of fear, anxiety, and distress. This may lead to an exaggerated response not proportionate to the actual likelihood of experiencing gun violence in Chicago. Of course, appealing to fear in circumstances where there are reasonable grounds for fear is a legitimate argument, but the emotional element needs to be made explicit in evaluating the argument.

Such an argument is very vulnerable to a counter argument. We can imagine the follow up conversation between partners in which there is a counter auditory argument: sounds of children laughing and playing in a park, also recorded in Chicago. This might lead to another conclusion.

The counterargument would then be reconstructed as follows:

GENERAL PREMISE: Only in a safe environment would parents let their children to play outside.
SPECIFIC PREMISE: Children in Chicago play outside.
CONCLUSION: Chicago is a safe environment.

4.3 Example #3 – Murder most foul

This is the most interesting example because it was used for a persuasive purpose in a real-life situation, specifically, in a criminal trial, and it was crucial for the conviction of Byron Smith for murder.

On Thanksgiving Day, 2012, Byron Smith shot two teenaged cousins who broke into his house unarmed. He hid his car so it would appear that nobody was home and waited for the intruders, sitting in his chair in the basement. He put an audio recorder on a book shelf. The recording of what happened includes artificial sounds (the gunshots), nonverbal human sounds (the screams of the victims), and prosodic features (Smith's ironic tone when speaking to the dead). It is also very carefully indexed to a particular time, place, and individual. We analyse the recording as one whole sound premise. (TomoNews US, 2014)[4]

Argument reconstruction in this example would be as follows

SPECIFIC PREMISE: Recording 3. (there is a recording of Byron Smith committing the murder of two teenagers)
GENERAL PREMISE: An audio recording of a person X committing a murder is a sign that person X is a murderer
FIRST CONCLUSION: Byron Smith is a murderer
GENERAL PREMISE: Murderers should be convicted for murder
FINAL CONCLUSION: Byron Smith should be convicted for murder

Reasoning analysis

Since the recording was made by the accused and then used in his criminal trial, there seem to be few doubts about its authenticity. There is the possibility that it is a hoax, but the discovery of two dead teenagers in Smith's house suggests that is not the case. That discovery, and other known facts about the case, make the interpretation of the sounds easier and more certain. The sounds are interpreted within a context where the listener is trying to fit them to what is known of the actual events, rather than trying to construct a sequence of events which could fit the sounds.

If we follow the above argument reconstruction in which we claim that Byron Smith is a murderer, then the degree to which the inference can be justified will rely on extra information outside the mere sounds in the recording. To be a murderer (and convicted as such) there needs to be a dead person, and certain legitimate reasons for killing another

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[4] URL: https://www.youtube.com/watch?v=r6RGXGgTr6g

person need to be ruled out. Based on the recording we cannot be sure if the victims were just wounded and survived, or they were killed; we do not know if they were themselves carrying firearms with which they threatened Smith.

Under Minnesota law, a person may use deadly force to prevent a felony from taking place in one's home. However, during the trial, the prosecution successfully argued that Smith crossed a line when he continued to shoot the teens after they were no longer a threat. The sounds in the recording suggest that this was the case.

Expression analysis

Unlike the earlier examples, this recording has no problems with PQs of Clarity or Coherence. The sounds are clear and could not likely be misinterpreted: sounds of gunshots, human sounds of pain and screaming, the sound of Byron Smith's voice. Together they form a coherent picture of what was occurring. Although we shall not discuss this in depth here, this recording is also a good example of how prosodic features can present a key element of an argument by themselves. Certain elements of his prosody prove that the man in the recording is in fact Byron Smith. What he is saying is also important, but in the question of determining whether the sound is clear enough for the purposes of the argument, the prosodic features of his speech are essential.

There are no difficulties with Consistency, Concept, or Completeness either. Certainly, the sounds carry an emotional charge, something which might have affected the jury, but given they were being used to convict the actual killer of actual victims, there is no sense here of an illegitimate or exaggerated appeal to fear.

In the rest of the recording we hear Byron Smith talking to himself, but addressing the corpses, saying: now you are dead. At this stage, the verbal content of his speech becomes important for a more traditional, propositional argument from testimony reconstruction.

This audio recording was a crucial part of Smith's criminal trial not only as proof that he did commit murder but also in determining the sentence. The sounds formed a specific premise in an argument that was used to reach the conclusion that Byron Smith should be convicted for murder. And he was. He is currently serving a life sentence.

4.4 Discussion of Results

Whilst there are a few important limitations to our example evaluations, we believe that they do show that the adapted CAPNA is capable of enabling the production of evaluations of auditory arguments which are useful and meaningful. One of the main features of the CAPNA is its ability to draw out areas of potential weakness in arguments which may lead to a rejection or become a point of contention between analysts. In all three cases here described, the assessment process has revealed interesting and valuable aspects of the arguments put forward.

The limitations are partly due to a lack of space but mainly a reflection of the fact that multimodal argument research is still in its early stages. We have not attempted to implement a full description or argument type identification procedure, preferring for the moment to stick with one type of argument which we take to be commonly instantiated in auditory form: the argument from sign. Also, we have investigated arguments using sounds representing only a limited part of our typology: artificial non-human sounds (gunshots), and human sounds not connected with a verbal message (screams). We acknowledge that the category of human sounds connected to the verbal message, i.e. prosodic features of speech, accents and so on, requires the development of a specialist framework for identification and assessment. Given that phoneticians have completed a large body of work on this topic and continue to expand their ability to make such distinctions, the construction of this framework is an arduous but perfectly possible research task, not a fantasy.

5. Conclusion

Work on multimodal argumentation is in its infancy, and this paper should be seen as a small step in the creation of the foundations of that sub-field. In attempting to modify an evaluation framework, the CAPNA, which was designed for verbal argumentation, we have put in place what we believe are several important elements in the fledging theory of auditory arguments.

Firstly, we have provided a concise definition of an auditory argument as an argument which employs elements of sound to express or support its inference. Since only one part of the argument need be in sound form, this makes auditory arguments a sub-class of multimodal

argument, and makes the label non-exclusive: an auditory argument may also be a visual argument if sounds are combined with pictures.

Secondly, we have offered a typology of sounds, which is useful to anyone analysing auditory arguments in establishing the types of question they should be asking in their evaluation. We suggest that sounds can be divided into the human and the non-human, with the former further divided into features of speech and other noises, and the latter split into natural and artificial sounds. We have also noted that any sound used in an argument can be specifically indexed to a particular event or can be used in a generic sense as representing a type of event.

Thirdly, we have considered the roles which sounds may have in arguments and the types of arguments in which they may appear. This is an area which certainly requires further work, but we have suggested that auditory arguments may follow the inference patterns of a wide range of established argument schemes.

Lastly, in modifying the procedural questions of the CAPNA we have had to address how auditory arguments differ from those made verbally, and this has led to a number of insights. We have seen that where a propositional premise can be examined for its truth or likelihood, a sound premise must be judged to a different standard. We have introduced the quality of authenticity, but further consideration of this point is necessary. The authenticity of a sound contains two distinct elements: that it is genuine in the sense that it has not been doctored or manipulated, and also that it is what it is represented by the arguer to be. Where sounds are characterised indexically, the business of checking their authenticity is both vitally important and potentially difficult.

In terms of the Expression analysis, there is much similarity with verbal content, but even when only a small adjustment is needed to the procedural questions, their application may be quite different. For instance, the quality of Clarity is vital to both language and sound in an argumentative setting, but they are hardly the same thing. A sound may be unclear for technical reasons, because of other competing sounds, or simply because it is not distinct enough for a certain interpretation; whereas a sentence may be unclear because of awkward grammar, obscure vocabulary, or a simple lack of precision in terms.

Another interesting development is the way in which the category of Coherence changes for sounds. In the original description of the

CAPNA, the PQs in this section were designed to detect the combination of elements from different premises into an incoherent conclusion. The possibility of simply incoherent language did not come into play because such an argument would not have passed through the initial analysis stage. With auditory input, however, incoherence may appear only in the deeper expression analysis, as parts of the sound are only noticed and considered during close examination. That is to say that a sentence which offers a statement and its negation would be noticed at once, a sound with mixed meanings might well pass a first listening.

Most surprisingly, the category of Concept which was originally drawn from a consideration of various aspects of the philosophy of language turned out to have applicability to sounds. As Example #1 showed, the use of auditory input can imply a particular interpretation of what sound is or a definition of what a particular type of sound could be. Thus, auditory arguments may commit the fallacies of Concept originally envisaged as being due to the nature of language itself.

The main goal of this paper, to show that a non-reductionist evaluation of auditory arguments is possible through the employment of a modified version of the CAPNA, we take to have been achieved. We acknowledge that much work remains to be done on the identification of argument types and the different ways in which sounds from across the typology we offer should be interpreted and examined. The category of authenticity and how it is to be tested, in particular, must be further investigated, and an entire new level of analysis based on advances in phonetics should be created to deal with prosodic features. However, we believe that we have shown that the CAPNA is flexible enough to be applied to auditory arguments and that auditory arguments are manageable enough for a procedural evaluation to be carried out upon them.

We hope that further research will refine the approach we have taken to auditory arguments here and follow the path we have laid to establish reliable evaluation procedures for argumentation in any and all modes. In particular, we plan to expand on the work in this study to include forms of description and evaluation which can be used in the assessment of combined auditory and visual argumentation, and the combination of verbal and nonverbal elements within argumentative texts.

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