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A New m-Learning Scenario for a Listening Comprehension Assessment Test in Second Language Acquisition [SLA]

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Abstract: Computer adaptive language testing offers the possibility to research and practice m-learning using ubiquitous technology. Virtual education in m-learning uses conventional Learning Objects (LO) to enable the possibility of development of several tasks oriented towards language learning including the assessment and verification of skill improvements in second language acquisition. So far, there are few research papers on the impact of using new multimodal digital resources as LO in the design process of foreign language assessment tests through mobile devices because many English certification tests still continue to use traditional testing techniques [face-to-face and pen-and-paper assessments] combined with conventional digital environments oriented to virtual education. Learning languages requires not only new m-learning scenarios for assessment but also multimodal interactive environments to improve the user's experience during proficiency tests or language certification. Multimodal object learning such as augmented environments, learning games, spatial sound, etc. can be integrated into an assessment process to enhance the user´s experience by simulating natural communicative scenarios. The present article defines an innovative new m-learning scenario for listening comprehension assessment in an on-line test by implementing a multimodal audio learning source named binaural sound. Use of this technology will enable demonstration of other possibilities of human interaction to improve the user´s experience in language learning through sound perception and its cognition from the user in an especific learning task.

Keywords: m-learning, foreign language assessment, Computer Assisted Learning Language [CALL], listening comprehension assessment, multimodal resources, binaural audio
Categories: L.0.0, L.3.5, L.3.8, I.2.6, I.3.8, H.5, H.5.2, K.3.1, J.0

1 Introduction

Mobile language learning and testing have progressed in the last years almost at the same speed as technology development and the increasing use of virtual educational platforms for m-learning [Traxler,2015a]. At the same time, m-learning has also

become a prevailing trend within e-learning [Ozdamli, 2015] [Uzunboylu, 2015] that has led to the increasing importance of ubiquitous learning environments (u-learning) [Casey, 2005]. Adaptive mobile assessment systems have been developed in a number of cases [Huang, 09] like the SEMS [Kaiiali, 16] but none for foreign language learning. Thus, the importance of combining both issues represents a great advantage for many institutions in external standardized exams such as the university entrance examinations worldwide [García Laborda, 2016]. However, it is necessary to improve means and methods to achieve better listening sections that overcome the current problems in listening tasks in mobile devices. To achieve this goal it is necessary to find new multimodal ways to make listening task more efficient and adequate to the need of mobile devices. As it can be seen in figure 1, from the OPENPAU project (Spain) (FFI2011- 22442), there is variety of m-learning scenarios where listening for language learning takes place.

Figure 1: Language learning m-learning environments of the OPENPAU project (Spain) [Magal-Royo, 2017]

A great emphasis in educational technology has focused on the study and analysis of users' experiences in order first to develop and implement learning objects [LO] that enable students to learn or assess the language and second to improve the quality and content of such learning objects. Additionally, the creation of new virtual environments must consider how to improve the quality of the user's experience when implementing LO in virtual environments. To do so, some m-learning environments must be adapted to discover the user's needs from different perspectives as well as to find an effective selection of interaction according to the device, the use of interactive digital elements as learning objects, and the selection of certain tasks for interaction with specific learning objectives.

In order to develop a language testing educational technology three aspects can be considered imperative for the design and full functionality a m-learning environment. These three aspects that can limit, enhance or expand a user's learning possibilities are efficiency, feasibility and reliability [Chapelle, 2006]. They are also necessary for the validation of language tests through web-based applications and are present in the design of m-learning environments adapted to both learning and language assessment. That is why the work of researchers such as Magal-Royo et al. [2007] looks at the possible ways, benefits and limitations to understanding functional and technological applications of usability in language learning and testing.

Several studies show how on-line testing enables acceleration of the user´s attitude and skill progress in language testing [Chapelle & Voss, 2016]. Thus, currently language testers, teachers, and students consider technology as a resource for improving methods – and therefore validity- and increasing knowledge in language learning and testing [Chapelle & Douglas, 2006]. García Laborda [2007] suggests the need to revise and develop new types of computer LO including specially adapted Internet-based tests and also states the types of items that should be created to establish new assessments in digital scenarios [García-Laborda, 2007:8]. In short, m-learning environments in foreign language learning and testing require not only a suitable communication channel to perform educational tasks but also the use of multimodal interactive resources that improve the user´s experience [Roever, 2001].

Based on previous research projects, the article first analyses the theoretical approach of how an exam task should be designed in a m–learning environment for second language learning. This approach considers all the variables currently concurrent in the certification of language exams for university and professional accreditation which currently do not consider the use of specific m-learning environments such as smartphones, tablets for example. For this reason, a functional scheme of the information flow which may be valid for ubiquitous environments is proposed, indicating all the possible variables to be taken into account according to the students' needs. Therefore, a specific reflection is made of the problem of designing the tasks for oral comprehension, evaluating the incorporation of audio files in a "binaural" format as a new type of learning in an assessment scenario that improves the user's experience. This type of sound must be taken into account in the field of language learning in the same way as it is being used in the creation of sounds in the latest generation of video games. This has allowed to define a design framework for listening comprehension tests using binaural sound as a multimodal resource in the m-learning environment that will allow future proofs of concept on existing or future foreign language learning platforms.

2 M-Learning environments in the assessment of Foreign Language Learning

Assessment requires a close construct definition to the learning tasks practiced during instruction. That is, exam tasks should be similar to those practiced in the class, thus mobile test tasks should resemble those practiced independently by the students in their own m-environments. So, the question is how those should be, Therefore, it is

necessary to know what m-learning environments are like to be able to give an adequate response to the student's and instructional needs.

When considering the way students learn in educational m-learning, O'Malley defines the concept as *"...any sort of learning that happens when the learner is not at a fixed, predetermined location, or when the learner takes advantage of the learning opportunities offered by mobile technologies"* [O'Malley et al., 2005:7].

For Kukulska-Hulme & Shield [2008], pedagogical research on Mobile Assisted Language Learning [MALL] is relatively new in language learning through ubiquitous devices. According to these latter authors, MALL differs from computer-assisted language learning because it uses portable devices, emphasizing the interaction and spontaneity of access. In recent years, several educational research projects have been carried out to confirm the huge possibilities and pedagogical implications of using ubiquitous devices for learning in general and in foreign languages in particular. Some of these projects reported the use of structures and methodologies with implications for m-learning with different learning resources [Pachler, 2010], [Kress & Pachler 2007].

As an example, the MOTILL Project led by Kukulska-Hulme [Seta, 2014] showed the evolution of m-learning in Lifelong Learning, [mLLL] as a key in the future of learning. The MOTILL project suggested good mobile learning practices and methodologies for policy-makers and other organizations involved in lifelong learning. In this sense, Traxler [2005b] assumed that the context and type of interaction with ubiquitous devices are important factors to define the type of m-learning scenario to be created for specific purposes. The most important issues in defining an m-learning scenario should be:

- An m-learning scenario should be portable because it can start in one place and finish in another.
- Learners should be able to study or practice manageable chunks of information at any place on their own time.
- Learners can take mobile devices into authentic context-aware environments.
- M-learning scenarios require a connection to be online and interactive anywhere.
- They also need to be personalized so that the learning process can be adaptable to the cognitive styles of different learners.
- They should include creative digital contents, materials and sources adapted for ubiquitous devices with different technologies and formats.
- They must be informal since learning can occur outside the classroom.

Mobile devices show a wide range of learning possibilities in language learning and assessment such as vocabulary learning, listening comprehension, grammar learning, pronunciation,reading comprehension, writing and speaking tasks, assessment and testing, etc. [Peng, 2013]. In fact, conventional learning objects in m-learning environments shares some features as some use strategies to be implemented in the face-to-face classroom. An example of a LO for listening comprehension can be found in podcasts offering learning through listening exercises using multimedia applications on mobile devices [Leow, 2014]. Students can access different websites in order to listen to and download podcasts, videos, music, etc. They can also use the

device´s voice recorder feature to record a monologue or dialogue. Students can download these files from m-learning environments in their own portable devices, analyse the kind of language they hear and reproduce it as often as they like.

In the design of a foreign language assessment task in a specific m-learning environment, it is very important to analyse the communicative language assessment process in order to understand the technological needs and to build the on-line application, which can be as in Figure 2.

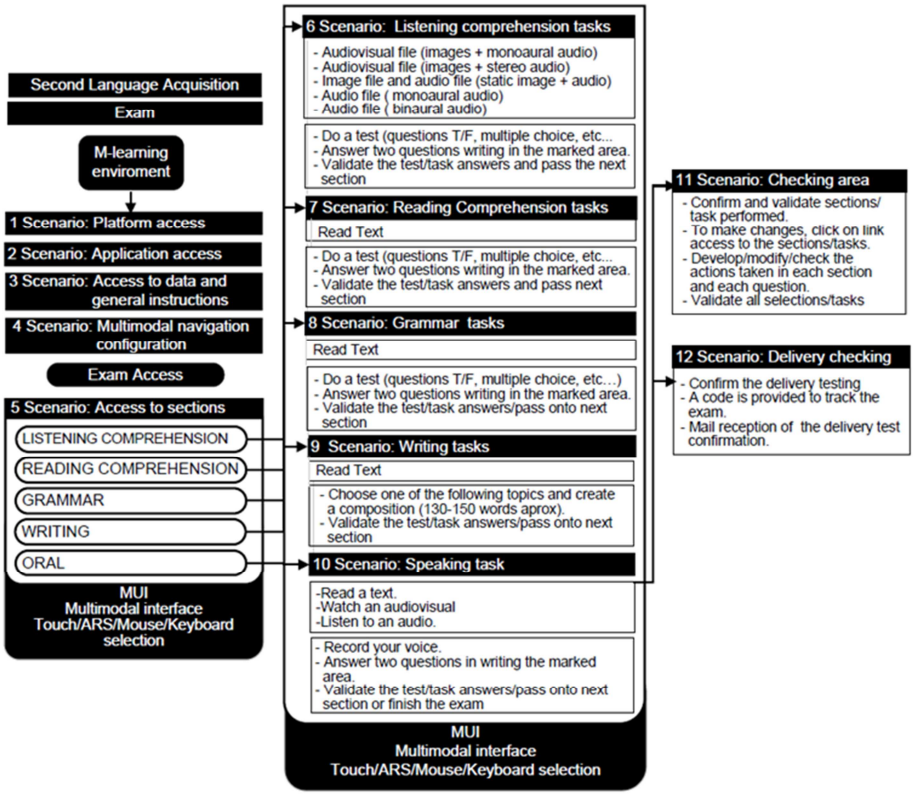

Figure 2: Global process description of an assessment task in SLA [Magal-Royo, 2017]

3 Multimodal learning objects versus traditional learning objects for mobiles testing listening tasks

Multimodal LO play a significant role in assessment since in the last last years there has been a significant effort to integrate tasks that can include different skills (such as combinations of different skills like listening-speaking, reading-listening, etc.). In that sense assessment learning objects should try to integrate multimodal communication as it resembles reality and thus enhances the validity of such LO (because they

resemble more the use of the language in real life). In this sense, the notion of the learning object, LO has the potential to serve as an effective framework for supporting the design and reuse of technology-based educational material and as well as favor favor the development of the individuals involved in these processes [Alessi, 2001]. According to Churchill a learning object is a representation designed to afford uses in different educational contexts. Learning objects have several features: they may be used and reused [reusability], have different sizes and can be cut up [granulated], can include metadata to describe the learning object itself, and can be composed of a content object and an instructional object [content and structure]. A learning object should also contain an internal logic to support collection of information [tracking] and to facilitate integration with other learning objects developed by different producers [standards], and it should be able to be implemented in different learning and content management systems (interoperability) [Churchill, 2006:480].

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At the same time, all types of m-learning objects appear to share these two common characteristics: they are digital, utilizing different media modalities [and often interactivity] to represent data, information, reality, concepts and ideas, and they are designed to afford educational reuse. Learning objects in assessment are used to create a specific task oriented at validating the skills and attitudes of the learners. As in general learning, common learning objects can be used in conventional and other learning environments. Surprisignly, they have not evolved at the same pace as technology since we continue to use them in the same way in both traditional and advanced learning environments. That is, sometimes Learning Objects are used in m-

learning as in face-to-face learning. For example, a learning object such as a diagram in the form of an image file or drawing is used on our screen to support knowledge that is necessary to learn as a whole. If this same drawing were constructed as an image file that can be seen with augmented reality, the cognitive implications in learning would be different. Additionally, teachers are not obtaining the maximum potential of Common Learning Objects in m-learning scenarios. This is especially clear in many online tests, where the difference between pen-and-paper and online tests is just the way of delivery.

From the assessment point of view it is necessary to define not only the contents and the instructions to be performed but also the score or score value that enable a summary or weighted evaluation criteria to be established depending on the activity or the evaluation type [Douglas & Hegelheimer, 2007]. The most common learning objects oriented to assessment in listening comprehension are audio and audio-visual digital recordings because they can be implemented in virtual education platforms online [Wipf,1984; Jamieson, 2005]. They can also be used in assessment tasks inside the course structure or even as an assessment test online. The technology implemented in audio recordings and even in audio-visual recordings is simple but their quality is relative. This means that sometimes there is not enough quality from the user point of view because the display reproduction is not suitable [Zheng et al., 2009]. For instance, in 2013 one of the researchers had the opportunity to attend the French Exam of the State College [Pennsylvania] school district. It was an online test but to his amazement, the listening section was played on a traditional tape player and the students responded to the questions on online. Thus, the students had different perceptions of the listening test delivered to them [and had varying chances to get high-quality sound]. In order to avoid situations like this, most online testing of listening has an audio reproduction heard directly from the computer speakers and sometimes it allows use of a headphone to isolate the test taker from environmental sound.

In relation to the contents, common audios and audiovisual records used are usually related to conversations, dialogues, dissertations, etc…depending of the assessment task proposed. For instance, the Educational Testing Service in TOEFL uses integrated skills, which usually include a combination of speech acts as well as writing and reading. The recordings sometimes come from the radio and television programs related to common situations in cultural and social life [Rost, 2013] but they are mostly created for the test itself by using actors. Many times, the tasks related to listening comprehension are combined with face-to-face recorded interviews and then inserted in on-line tests [Vandergrift & Goh, 2009] [Vandergrift, 2016]. One commercial example of high-stakes assessment which uses this kind of propmts is the TOEIC® Listening and Reading test [https://www.ets.org/toeic], which is mostly used to assess English-language skills for business communication.

In terms of the type of recordings, Wagner [2007] investigated the use of audio-visual recordings such as videos as learning objects in the assessment of comprehension tasks. He did several studies using a video listening test versus an audio-only listening test to determine individual differences in the use of video materials across users and the utility of the video in comprehending the meaning of audio. He found that throughout the test, learners tended to watch the video 69% of the time, suggesting that they enhanced the user's understanding in listening

comprehension tests [Wagner, 2007]. However, using audios without images requires more concentration and *a purely cognitive response*. Therefore, responses to tasks without the support of videos/images in tests are far more demanding on the user´s cognitive experience and permit testers to see more clearly the effectiveness of the listening comprehension task implementation. This implies that non-video supported tasks, while more unrealistic, allow more specific assessment of the test taker's listening capacity through the elimination of contextual clues.

To achieve this capacity for assessment, it is necessary to consider whether the sound perception is perceived as a conventional stereo sound, that is, the sound is perceived with the same degree of stimulation in both ears and there is not a natural ear spacing as happens in the real world. Obviously, this establishes a difference between real life sound and audio LOs specially-designed for language testing which also tend to make test listening tasks more difficult than they would be in reality.

However, as the use of computers and m-learning devices are taking a new place in language testing, the need to create more realistic prompts has overtaken the necessity to assess *pure simple listening tasks*. Exams like those delivered by the Cambridge Board of Examinations (First Certificate in English, Cambridge Advanced Examination and others) or the Eductional Testing Service (IB TOEFL) are increasingly looking at different ways to transmit information which resembles more real life communication. This means that multimodal [vision and sound] communication tasks are taking a prevailing position in their tests. Therefore, multimodal LOs integrate various perception modalities in their structure similar to?/such as? audiovisual recordings and this suggests that multimodality supports learning and assessment by allowing learners to learn and be assessed by exploring and linking different modalities [Van Someren, 1998], [Hu Yongjin, 2013], as we have seen before.

A specific type of multimodal learning object is oriented to contextual representations to allow learners to explore some realistic scenarios and collect data from the real world usually for the purpose of inquiry and problem-solving and even a comprehension test [Bezemer & Kress, 2015], [Hafner, 2015]. In the case of binaural audios, an independent record has been made depending on the space between the ears when it is heard. The user can perceive the spatiality of the environment, the position of the object and the conversation agents involved, as is in the real world.

This concept of multiple perception in listening allows us to interpret binaural sound as a multimodal object for learning from the point of view that it stimulates user spatiality of sound perception and short-term working memory [Bizley et Al., 2016]. The short-term working memory is used by our brain during binaural audio listening and this effect concentrates the student's effort in a more realistic and comfortable audio listening [de Gotzen, 2004]. Binaural audio from real world listening perception could be a multimodal learning object resource, useful for listening comprehension testing in second language assessment.

The term 'binaural' literally means 'to hear with two ears', and it was introduced to refer to the practice of listening to the same sound through both ears, or to two discrete sounds, one through each ear. The distinction is made between dichotic listening, which refers to the stimulation of each ear with a different stimulus, and diotic listening, the simultaneous stimulation of both ears with the same stimulus. The term "binaural" has frequently been confused as a synonym for the word "stereo" but

stereo sound does not record this natural ear spacing. However, further research must still examine two different issues: the user´s perception during this type of listening, which could be stressful and create bewilderment, and its feasibility and implementation in real digital scenarios.

5 Defining new scenarios for listening comprehension assessment in m-learning

The web-based language testing challenges pointed out by Roever, must be revised from the user´s interaction point of view [Roever, 2001]. M-learning interaction has had a huge development in the last years, especially new digital environments, through the development of the web and especially the existence of new ubiquitous devices that allow for different types of digital communication with interoperatibily data [Oviatt, 2013], [Guichon & McLornan, 2008], [Magal-Royo et al., 2012]. However, in the process of designing and implementating the process to create new scenarios it is necessary to outline several conditions to determine the feasibility of a digital environment [García-Laborda et al. 2015]. In general, these are conditions to meet:

- User interaction validation procedures to promote and enhance real situations with different types of media during test taking [Chen Yu, 2004].
- Validation of the interoperability between different types of delivery platforms for computer adaptive language testing such as Moodle or others.
- Promotion of the compatibility of tasks, tests and exams in different digital environments
- Promotion of the compatibility between digital environments as well as the creation of a tool to customize interaction during test delivery.
- Analyses of the potentiality of both low-tech Web-based Technology, WBTs and high-tech WBTs to universalize their use in computer-adapted language testing in high-stakes assessment.
- Analysis of new multimodal types of digital resources to enhance the user´s experience during aptitude tests.
- Creation of new learning strategies specially aimed at computerized dynamic assessments with digital resources.
- Creation of a new computerized assessment dynamic in oral testing over the web using real-time one-on-one voice chat or computer-generated speech.

Taking into account some of these premises, a new scenario has been designed to serve as an evaluation test for listening comprehension; it uses binaural sound as a multimodal resource to create 3-D sound, which can reduce many of the drawbacks mentioned above [Figure 3].

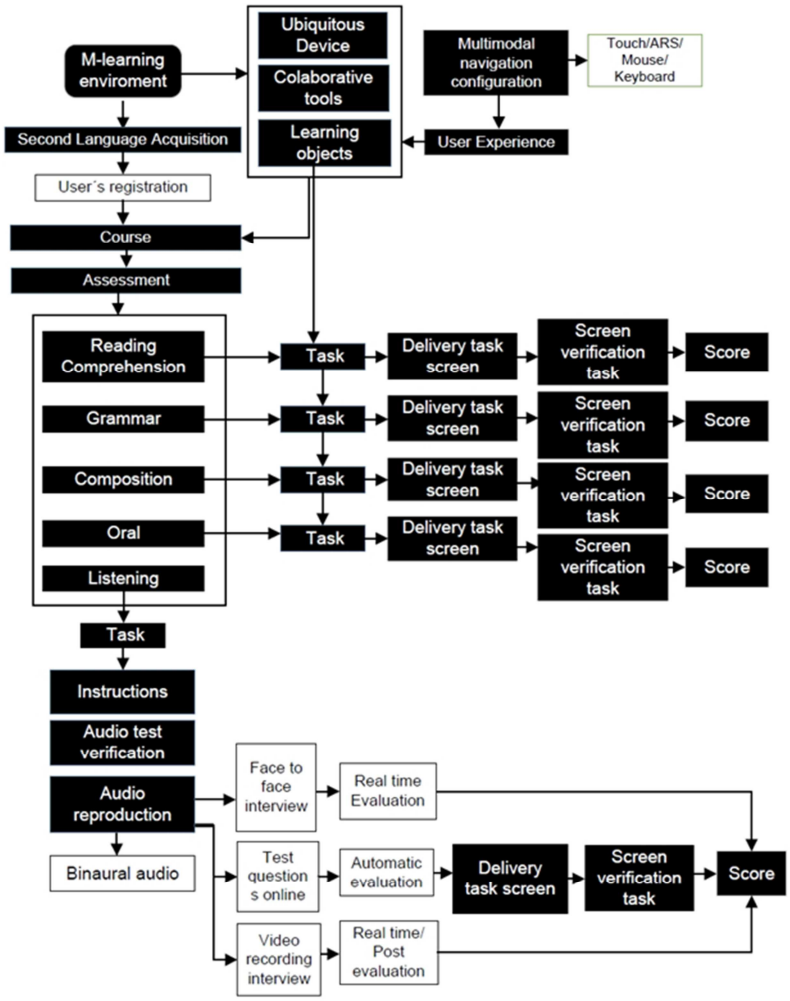

Figure 3: Design framework for listening comprehension tests using binaural sound as a multimodal resource in the m-learning environment [Magal-Royo, 2017]

As mentioned before, the use of this new type of multimodal resource in the listening comprehension assessment process links it to other types of evaluation like online test tasks, face-to-face interviews or video recorded interviews [Yongmei, 2013], [Prior, 2012], [Van Leeuwen, 2011]. Moreover, it enhances the quality of the test taker's intake which, in turn, is expected to benefit comprehension and test performance. As in other projects run by the authors mentioned above, the summary of all the acts and test evidences (through test responses) with their corresponding evaluations can be executed in real time and/or stored in different digital spaces so that the correctors can make a global assessment to obtain a final score. However, the

process of linking the assessments obtained from a listening comprehension test [or sub-test] will need to have the features related to any testing process such as:

- A data recording system.
- The graphic type and the statistical score treatment obtained from each student including the analyses of different subsections within a test, internal and external warrants of validation and, most importantly, impact validation.
- The global and partial [for each section] scores obtained to determine the student´s achievement and performance.
- Study of the global and partial assessment and the validation criteria may lead to future improvement of design strategies in language tests.
- All these factors will certainly have an effect on the improvement of current methods for assessing foreign language. The implications can be especially solid in the listening section of high-stakes and certification language tests.

6 Conclusions

Based on the theoretical approach shown in the article related to SLA assessment m-learning environments, it can be concluded that it is necessary more research about process development framework of on-line exam on mobile devices including new and innovative types of digital content focus to language learning according to technological advances nowadays.

It is necessary to define new scenarios for language testing in m-learning. This is especially relevant for the listening sections, which by far require more realist deployment than the current ones. This can be achieved through a specific assessment listening comprehension scenario using a multimodal interface and binaural sound as well as a new generation of LOs oriented to enhance the listening user´s experience with different devices [Figure 3].The implementation of binaural sound in language tests enables the opening of new fields of research in effective conditions that benefit the listener in carrying out the test tasks.

Moreover, a scenario for listening comprehension assessment using binaural sound as a multimodal learning object source has potentially positive possibilities if used in an educational assessment event. In such cases, drawbacks introduced by deficient delivery means can be reduced and better quality of the test taker's output obtained.

Of course, this will lead to maximized evidence collection in language tests and improved quality of language assessments. The main reason for this is that lower levels of interference from external agents mean greater possibilities to obtain quality, cognitive data from the test taker without interference, which in many cases distorts the final grade, as seen in the State College example above.

It is self-evident that a lot of work is necessary to achieve this goal, especially the movement from our theoretical framework to more realistic implementations. In fact, the framework we have suggested faces two main limitatations: not all testing boards worldwide may be willing to introduce changes which make delivery more expensive [i.e. by creating more complex listening items] and test takers need new training and that takes time.

Future research in this area obviously implies the study of whether binaural items in language tests actually lead to better assessment items and whether the difficulty of creating this type of LOs can be compensated by the efficiency of new listening tasks. Observing test takers‘ responses to new items is a must and examining the difference between traditional items and new items is practical.

All in all, the researchers consider that, due to the improvement of listening conditions, tests using binaural sound m-scenarios have a very attractive potential that should be addressed in future papers. In this sense, this paper is a first step in a not-so-distant future path towards better assessments of listening comprehension.

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