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SERIES P: TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS

Methods for objective and subjective assessment of
speech and video quality

Subjective evaluation methods for gaming quality

Recommendation ITU-T P.809

ITU-T

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Recommendation ITU-T P.809

Subjective evaluation methods for gaming quality

Summary

Recommendation ITU-T P.809 presents guidelines for conducting subjective experiments for the quality of experience (QoE) assessment of gaming services. First, an overview about gaming QoE features covering hedonic and pragmatic quality as well as player experience is given. Additionally, methods for two test paradigms, passive viewing-and-listening tests and interactive tests, are described including information about the test environment and test set-up, participant instructions, selection of game materials and a list of available questionnaires for the assessment of several gaming QoE features such as flow and immersion.

History

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* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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Introduction

In addition to voice, video and web browsing, increasingly popular services running on top of IP-based networks are online computer games. However, in comparison to the aforementioned services, less information exists about subjective evaluation methods for assessing the quality of experience (QoE) of gaming services. To ensure the validity, reliability, and objectivity of results, standardized methods for the assessment of subjective ratings are highly important. This allows the comparison of results of different studies and forms a basis for building instrumental quality prediction models for gaming services.

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Recommendation ITU-T P.809

Subjective evaluation methods for gaming quality

1 Scope

This Recommendation describes subjective evaluation methods providing information about the quality of gaming services, as experienced by users of such services. Since there is currently no standardized method available for the evaluation of gaming quality, this Recommendation should be seen as state of the art in order to help choose suitable methods to conduct subjective user tests. The assessment of gaming quality of experience (QoE) is important when planning and implementing online gaming services as well as for the development of instrumental quality prediction models.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T P.851] Recommendation ITU-T P.851 (2003), *Subjective quality evaluation of telephone services based on spoken dialogue systems*.
- [ITU-T P.880] Recommendation ITU-T P.880 (2004), *Continuous evaluation of time-varying speech quality*.
- [ITU-T P.910] Recommendation ITU-T P.910 (2008), *Subjective video quality assessment methods for multimedia applications*.
- [ITU-T P.911] Recommendation ITU-T P.911 (1998), *Subjective audiovisual quality assessment methods for multimedia applications*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 cloud gaming [b-ITU-T G.1032]: Cloud gaming is characterized by game content delivered from a server to a client as a video stream with game controls sent from the client to the server. The execution of the game logic, rendering of the virtual scene, and video encoding are performed at the server, while the client is responsible for video decoding and capturing of client input.

3.1.2 eSport [b-ITU-T G.1032]: A form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of players and teams as well as the output of the eSports system are mediated by human-computer interfaces.

3.1.3 game bricks [b-ITU-T G.1032]: A rule-based game classification splitting the games into several fundamental elements such as moving and shooting. In total, ten "gameplay bricks" in two categories are proposed by [b-Djaouti], rules stating goals, including avoid, match, and destroy, and rules defining the means and constraints to reach the goals consisting of create, manage, move, random, select, shoot, and write.

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3.1.4 genre [b-ITU-T G.1032]: A classification of games where games are grouped according to their gameplay characteristics.

3.1.5 online gaming [b-ITU-T G.1032]: A service that enables a video game to be either partially or primarily played over a broadband network. The service renders the game at the client device while the updated states of game are transferred over a broadband network.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 game: A game is a rule-based system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels emotionally attached to the outcome, and the consequences of the activity are optional and negotiable [b-Juul].

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ACR	Absolute Category Rating
EEG	Electroencephalography
GEQ	Game Experience Questionnaire
GPU	Graphics Processing Unit
HD	High Definition
MMORPG	Massively Multiplayer Online Role-Playing Game
QoE	Quality of Experience
SI	Spatial Perceptual Information
TI	Temporal Perceptual Information
UX	User Experience
VE	Virtual Environment

5 Conventions

In this Recommendation, online gaming is referred to as a service that renders the game on the client device while the updated states of a game are transferred over a broadband network. In contrast, in cloud gaming there is no processing (execution of the game logic, rendering of the 3D virtual scene) on the client. Within the scope of this Recommendation, the person interacting with a game is referred to as the player, whereas the software, which is used in cloud gaming set-ups to display a remotely rendered game video stream, is referred to as the client.

6 Quality of experience aspects for gaming

As with previous studies about the quality experience in video games, gaming QoE is a multi-dimensional construct involving the quality features illustrated in Figure 1 (see also [b-Möller]), which are explained in the following clauses.

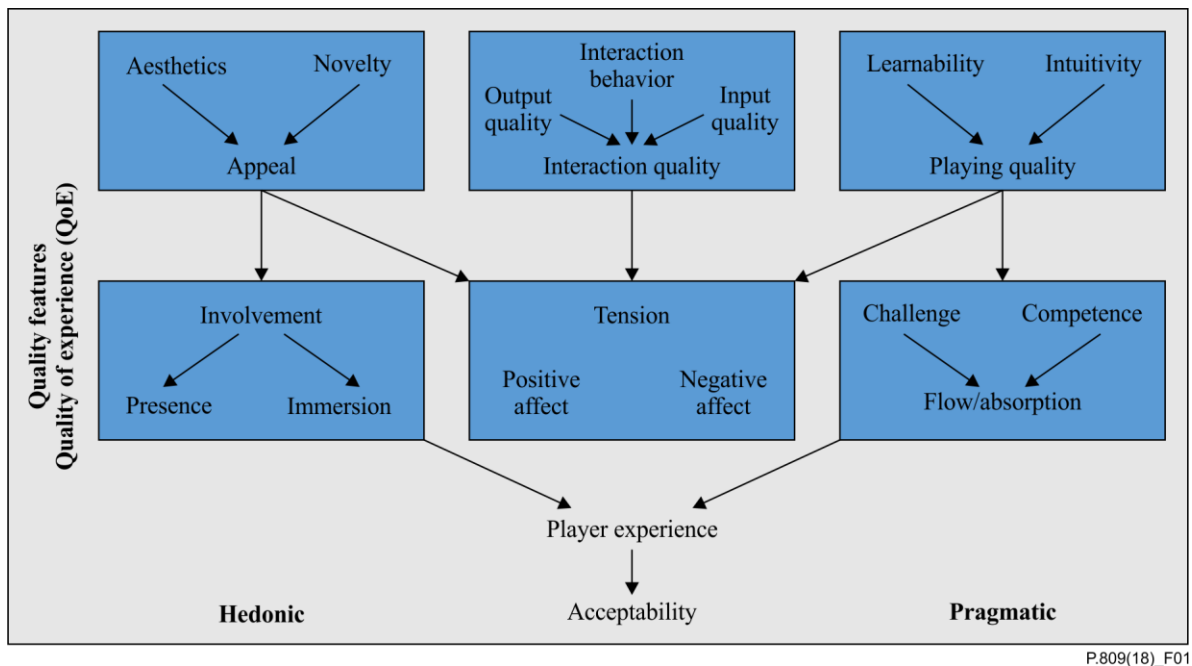


Figure 1 – Quality features of gaming QoE

6.1 Aesthetics and appeal

Aesthetics are the sensory experience that the system elicits, and the extent to which this experience fits an individual's goals and spirit, see [b-Vilnai]. The system's personality refers to users' perception of the system characteristics originating from technical and game characteristics. The appeal is a result of the aesthetics of the product, its physical factors, and the extent to which the product inherits interesting, novel and surprising features, see [b-Stelmaszewska], [b-Hassenzahl].

6.2 Interaction quality

Interaction quality refers to the playability of the game in terms of the degree to which all functional and structural elements of the game (hardware and software) provide a positive player experience. This definition considers playability as a prerequisite of positive player experience (similar to usability being considered a prerequisite of user satisfaction), or as a technical and structural basis for this, but not the player experience itself. This interpretation of interaction quality agrees with the general definition of this term for multimodal systems and includes input quality (player to system, output quality (system to player, e.g., in terms of graphics quality, video quality, sound quality), as well as the interactive behavior (in task-oriented interaction this is called "cooperativity", but as a game storyline is not designed to be cooperative to the user, the general term interactive behavior is more appropriate here).

6.3 Playing quality

Playing quality can be considered as a kind of game usability. This is defined by Pinelle et al. [b-Pinelle] as "The degree to which a player is able to learn, intuitively control, and understand a game. Game usability does not address issues of entertainment, engagement, and storyline, which are strongly tied to both artistic issues (e.g., voice acting, writing, music, and artwork) and technical issues (graphic and audio quality, performance issues)".

6.4 Engagement

The following clauses present an overview of several concepts describing engaging experiences while playing games. These concepts are: involvement, immersion, presence, flow and absorption.