



(11)

**EP 3 155 827 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:

**06.10.2021 Bulletin 2021/40**

(51) Int Cl.:

**H04R 25/00 (2006.01)**

(86) International application number:

**PCT/EP2014/062542**

(21) Application number: **14729932.5**

(22) Date of filing: **16.06.2014**

(87) International publication number:

**WO 2015/192870 (23.12.2015 Gazette 2015/51)**

**(54) METHOD FOR EVALUATING AN INDIVIDUAL HEARING BENEFIT OF A HEARING DEVICE  
FEATURE AND FOR FITTING A HEARING DEVICE**

VERFAHREN ZUR BEURTEILUNG EINES INDIVIDUELLEN HÖRNUTZENS EINES HÖRGERÄTS  
UND ZUR PASSUNG EINES HÖRGERÄTS

PROCÉDÉ POUR ÉVALUER UN BIENFAIT AUDITIF INDIVIDUEL D'UNE CARACTÉRISTIQUE DE  
DISPOSITIF AUDITIF ET POUR INSTALLER UN DISPOSITIF AUDITIF

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
PL PT RO RS SE SI SK SM TR**

• **LECHNER, Hubert**  
**8057 Zürich (CH)**

(43) Date of publication of application:

**19.04.2017 Bulletin 2017/16**

(74) Representative: **Troesch Scheidegger Werner AG**

**Schwäntenmos 14**  
**8126 Zumikon (CH)**

(73) Proprietor: **Sonova AG**

**8712 Stäfa (CH)**

(56) References cited:

**WO-A2-2006/002035 WO-A2-2007/039649**  
**WO-A2-2015/075279 US-A1- 2009 196 448**  
**US-A1- 2013 343 583**

(72) Inventors:

• **ROECK, Hans-Ueli**  
**8634 Hombrechtikon (CH)**

**EP 3 155 827 B1**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

### TECHNICAL FIELD

**[0001]** The present invention pertains to a method for evaluating an individual benefit of a hearing device feature and for fitting a hearing device.

### BACKGROUND OF THE INVENTION

**[0002]** Hearing devices such as hearing aids (also referred to as hearing prostheses or hearing instruments) for hard of hearing people or hearing enhancement devices for augmenting the hearing capability of normal hearing persons, as well as hearing protection devices designed to prevent noise-induced hearing loss, commonly comprise an input transducer, e.g. a microphone, for picking up sound from the surroundings, a signal processing unit for processing the signal from the input transducer, and an output transducer, e.g. a miniature loudspeaker also called a receiver, for converting the processed signal into a signal perceivable by the user of the hearing device. Typically such hearing devices are adapted to be worn at the ear (e.g. a behind-the-ear, BTE hearing device) or within the ear canal (e.g. an in-the-ear, ITE or completely-in-canal, CIC hearing device), or alternatively be partly anchored in the skull (e.g. a bone-anchored hearing aid, BAHA) or partly implanted in the middle or inner ear (e.g. a direct acoustic cochlear stimulation, DACS, or cochlear implant). Furthermore, such hearing devices commonly incorporate a number of different functionalities or features, which provide a range of benefits to the user and allow to improve the user's hearing experience to various degrees. Usually, some basic features are provided in all hearing devices, whereas advanced features, for instance employing more sophisticated audio signal processing such as adaptive beamforming and binaural signal processing, or providing more complex functionalities such as wireless audio streaming, are only offered by high-end hearing devices, which are therefore more expensive. A hearing device professional, such as an audiologist or hearing aid acoustician, often referred to a hearing device "fitter", will select a suitable hearing device model along with appropriate features depending on the needs and preferences of a certain user. In order to demonstrate the benefits and usefulness of the selected hearing device(s) and especially of the chosen features the audiologist commonly plays back recorded sound samples associated with a limited number of standard hearing situations via a loudspeaker setup located at the audiologist's office to the user wearing the selected hearing device(s). Unfortunately, this is a very tedious process and it is often difficult to show the benefit of certain features to the user in such artificial surroundings. Consequently, the user will often be hesitant to invest in a certain feature when he is not fully convinced of its usefulness in his everyday life.

**[0003]** US 2009/0196448 A1 discloses a user pro-

grammable hearing aid which allows a user to select acoustical configuration programs that provide optimum performance for the user.

**[0004]** The user may cycle through and evaluate various available programs by rotating a scroll wheel on the hearing aid housing to switch from one program to the next. When a preferred program is active, the user can press a push button on the housing for an extended time to select the currently active program. The user can then use the scroll wheel to adjust the audio gain for the selected program.

### SUMMARY OF THE INVENTION

**[0005]** It is therefore an object of the present invention to support the process of acquiring a hearing device that provides a desired level of usefulness to its user and thus results in a high level of user satisfaction.

**[0006]** This object is achieved by the method for evaluating an individual benefit of a hearing device feature according to claim 1. Specific embodiments of the proposed method are provided in the dependent claims 2 to 15. In particular the control means is adapted such that when the user switches off the at least one second hearing device feature the at least one first hearing device feature is switched on, and when the user switches on the at least one second hearing device feature the at least one first hearing device feature is switched off. However, it should be noted that basic and advanced features can be applied concurrently (i.e. simultaneously), so that when an advanced feature is turned off it is not necessary to turn on a basic feature to replace the advanced feature. For instance a basic feature could be frequency dependent amplification for compensation of a frequency dependent hearing loss, which is active all the time when the hearing device is in use. To demonstrate an effect of an additional, advanced feature such as adaptive beamforming would simply require switching on and off the adaptive beamformer, whilst the frequency dependent amplification remains active independent of whether adaptive beamforming is presently being applied or not.

**[0007]** By employing the proposed method the user is given a chance to consciously experience the benefits of advanced features as provided in higher priced hearing device models without the financial obligation of buying them right away, and without the audiologist having to try to demonstrate these benefits in his office or right outside of his office. Because normally the user is not aware when advanced features that are not permanently applied but only in certain hearing situations are actually in effect, just using a hearing device over a period of time, e.g. for some weeks, and employing an advanced feature when the user is not aware thereof is not sufficient to get a good understanding and own impression of the feature's benefit. Therefore, according to the present invention it is indicated to the user that an advanced hearing device feature is presently being applied (and thus that the current acoustic situation is suitable for experiencing

the benefit of the advanced feature), and moreover, a control means is provided for the user to turn off and on the feature in order to be able to compare the perception of the current personal, real-life hearing situation when the feature is being used and when it is turned off, thus allowing the user to consciously form a personal opinion regarding the benefit of the feature.

**[0008]** In an embodiment the method further comprises the step b') of adjusting the at least one first and the at least one second hearing device feature to the individual hearing preferences and/or hearing requirements of a user of the hearing device.

**[0009]** In a further embodiment of the method steps a), b) and b') are part of an initial fitting process, and/or steps c) to h) are part of operating the hearing device during an evaluation (or trial) period.

**[0010]** In a further embodiment of the method at least one of:

- indicating that the at least one second hearing device feature is currently being applied;
- the control means for switching off and on an effect of the at least one second hearing device feature,

is provided to the user by means of a separate, auxiliary device, such as for instance a remote control unit or a smartphone.

**[0011]** In a further embodiment of the method classifying the current hearing situation comprises determining different sound types and/or determining different connectivity settings, such as for instance determining whether the audio signal is derived from at least one microphone of the hearing device and/or from a (e.g. wireless) signal received by the hearing device. The connectivity settings for instance indicate whether the audio signal, e.g. originating from a telephone, a radio or television, is being streamed to the hearing device, e.g. via Bluetooth, or whether it is being picked-up by a microphone.

**[0012]** In a further embodiment the method further comprises the hearing device automatically switching on and off an effect of the at least one second hearing device feature, when the at least one second hearing device feature has been automatically selected and activated. In particular the control means are adapted such that when the hearing device automatically switched off the at least one second hearing device feature the at least one first hearing device feature is switched on, and when the hearing device automatically switches on the at least one second hearing device feature the at least one first hearing device feature is switched off. Switching off (or on) an effect of an advanced hearing device feature does not necessarily require disabling (or enabling) the feature entirely, but can for instance be achieved by changing parameter settings associated with the feature such that its effect is substantially reduced (or increased), e.g. by more than 50%, preferably by more than 90%, compared

to the maximum achievable effect.

**[0013]** In a further embodiment the method further comprises requesting from the user a response indicative of the individual hearing benefit provided by the at least one second hearing device feature to the user.

**[0014]** In a further embodiment of the method as part of the step of requesting, the user is provided with one or more questions, for instance via a display on the auxiliary device or via the output transducer of the hearing device (e.g. in the form of speech).

**[0015]** In a further embodiment of the method the auxiliary device monitors the current hearing situation, for instance based on a sound signal pick-up by the at least one microphone of the hearing device or a microphone located at the auxiliary device.

**[0016]** In a further embodiment the method further comprises determining if it is potentially disturbing to provide an indication to the user that the at least one second hearing device feature is being applied, based on information, such as the number of responses already (i.e. previously) provided by the user indicative of the individual hearing benefit provided by the at least one second hearing device feature, the time of day, calendar data, motion activity data, a circadian rhythm, or a biorhythm, in particular available to and/or determined by the auxiliary device, and not providing the indication to the user if it has been determined to be potentially disturbing.

**[0017]** In a further embodiment of the method as part of responding, the user inputs data into the hearing device or the auxiliary device, e.g. via a user interface, or provides a voice input, which is for instance picked-up by the microphone of the hearing device or a microphone of the auxiliary device.

**[0018]** In a further embodiment of the method the user response is stored as user response data in the hearing device or in the auxiliary device or transferred from the auxiliary device to a remote storage device such as a server, for instance cloud storage.

**[0019]** In a further embodiment of the method the at least one second, advanced hearing device feature is permanently turned off and/or prevented from being selected (or being applied) for processing the audio signal after a predetermined period of time, for instance after a number of weeks, during the evaluation period, i.e. the period of initially operating the hearing device.

**[0020]** In a further embodiment the method further comprises retrieving the user response data stored during the evaluation period, for instance from the hearing device or the auxiliary device or the remote storage device, by a fitting software or a client management software or a web application or an app running on the auxiliary device, such as an app for a smartphone.

**[0021]** In a further embodiment the method further comprises, in particular as part of a further fitting process, at least one of:

- presenting an overview of the user response data stored during the evaluation period;

- analysing the user response data stored during the evaluation period;
- interpreting the user response data stored during the evaluation period;
- determining an individual hearing benefit for the at least one second hearing device feature from the user response data associated with the at least one second hearing device feature from the user response data stored during the evaluation period.

**[0022]** In a further embodiment the method further comprises configuring the hearing device such that the at least one second, advanced hearing device feature is permanently removed or permanently deactivated, or conversely is made permanently available. In particular, configuring the hearing device is performed after the evaluation period.

**[0023]** In a further embodiment of the method configuring the hearing device is dependent on at least one of:

- the determined individual hearing benefit for the at least one second, advanced hearing device feature;
- a selection of the at least one second hearing device feature by an audiologist or the user of the hearing device, for instance in a fitting software or a client management software or a web application or an app running on the auxiliary device, such as an app for a smartphone;
- performing a financial transaction, for instance by the user;
- providing a passkey or an activation code to the hearing device.

**[0024]** In a further embodiment the method is part of a self-fitting or of an online fitting process.

**[0025]** In a further embodiment of the method the at least one second, advanced hearing device feature comprises one of:

- highly directive and/or adaptive beamforming;
- adaptive noise cancelling;
- wind noise cancelling;
- automatic occlusion cancelling;
- frequency transposition/compression;
- binaural processing, wherein the hearing device is worn at a left ear and a second hearing device is worn at a right ear of the user, such as:

5

10

15

20

25

30

35

40

45

50

55

- providing the sound of a remote talker, e.g. originating from a far-end telephone, to the left and the right ear of the user;
- binaural wind noise cancelling;
- automatic listening, e.g. beamsteering, to the side or back when a relevant talker is detected there;
- providing many different, e.g. more than 3, automatically selectable hearing programs or signal processing configurations adapted for many different, e.g. more than 3, sound types or classes;
- audio streaming of at least one of a telephone, a television, a media player, a public address, and an alarm signal to the hearing device (e.g. providing a wireless headset functionality).

**[0026]** Examples of the first, basic hearing device features are for instance:

- hearing loss compensation in only a few, e.g. 1 to 3, frequency bands;
- noise cancelling for static background noise;
- static beamforming;
- feedback cancelling;
- providing only a few, e.g. 1 to 3, hearing programs (i.e. only a few, e.g. 1 to 3, different sound types or classes can be distinguished).

**[0027]** It is expressly pointed out that the above-mentioned embodiments can be arbitrarily combined to yield further specific embodiments of the method according to the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0028]** The present invention will now be further illustrated by way of an exemplified embodiment shown in the accompanying drawing and described in detail in the following. It is pointed out that this embodiment is for illustrative purposes only and shall not limit the present invention as set out by the claims.

Fig. 1 shows a flow chart of an exemplary embodiment of the method according to the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

**[0029]** In Fig. 1 a flow chart of an exemplary embodiment of the present invention is illustrated. A potential

customer (hearing device user) enters a hearing device store (@ step 10). An audiologist determines the user's hearing requirements for instance by measuring the user's audiogram (@ step 20). Based on the determined needs and personal preferences of the user a suitable hearing device model with an appropriate form factor is chosen (@ step 20). The audiologist performs a first fitting, i.e. he adjusts the hearing device settings according to the user's individual requirements (@ step 30). At this time all features supported by the chosen hearing device, i.e. both basic as well as advanced features, are made available to the user (@ step 20). Fine-tuning of the hearing device settings is performed so that a good initial acceptance of the hearing device is achieved while the user is still at the hearing device store, i.e. at the audiologist's/fitter's office (@ step 40). Subsequently, an appropriate app is downloaded to the user's smartphone or other auxiliary device such as a remote control unit (@ step 50). The smartphone is then paired with the user's hearing device(s), i.e. communication is established between the user's hearing device(s) and his smartphone. Following this, the user is instructed how to use his hearing device(s) as well as the app and sent home (@ step 70), where he uses his hearing device(s) in his individual real-life situations during an evaluation/trial period.

**[0030]** During initial use of the hearing device(s) during the evaluation period, a classifier determines the current hearing situation and dependent thereupon an advanced feature is selected and applied to processing the audio signal before being output via the loudspeaker of the hearing device. The hearing device informs the user via the app running on his smartphone that the advanced feature is presently active (@ step 80). The hearing device either actively sends this information to the smartphone or the app running on the smartphone periodically polls the hearing device for this information. The app then informs the user that he may currently experience the benefits of an advanced feature and asks if he wants to try it out (@ step 90). If the user wishes to do so, the app automatically toggles the advanced feature on and off a few times or the user does this manually (@ step 100). The app then asks the user if he experiences a benefit or not, e.g. by presenting a questionnaire to the user (@ step 100). The user's response, e.g. the user's answer to the questionnaire, is stored either in the hearing device(s), in the smartphone or remotely in a cloud storage (@ step 100). Specifically, the user's answer(s) is/are logged together with information regarding the advanced feature being demonstrated/evaluated.

**[0031]** After the evaluation/trial period, e.g. of a few weeks duration, the user returns to the hearing device store (@ step 110), where the audiologist retrieves the logged user responses from the hearing device(s), the smartphone or cloud storage, and subsequently analyses and interprets it (@ step 120). The audiologist then counsels the user about his usage of the advanced feature(s) and his experience thereof, and asks the user whether he wants to keep those advanced feature(s)

where he had experienced a benefit (@ step 130). The user then chooses which advanced features he would like to be able to use in the future (@ step 140). The audiologist then e.g. configures the software of the hearing device such that the chosen advanced feature(s) are available to be employed once the classifier determines a hearing situation where it is appropriate to apply one of the chosen advanced features (@ step 150). It is thus ensured that the user leaves the hearing device store with a certainty that he has only acquired those advanced features that provide an actual benefit to him in his individual real-life hearing situations (@ step 160).

**[0032]** In a further embodiment of the method the app is configured with an ID (identification) generated by the fitting software, which is e.g. entered manually into the app, so that personal data entered into the app may be associated with user's fitting record in the database of the fitting software (or a database associated with the fitting software).

**[0033]** In a further embodiment of the method the app may upload logging data to cloud storage immediately as it becomes available or later on, e.g. when a free WiFi service is available, or upon user initiation.

**[0034]** In a further embodiment of the method the hearing device automatically detects situations where the benefits of an advanced feature are best experienced by observing the activity (e.g. parameter settings) of appropriate actuators (e.g. of a beamformer, noise cancellers, connectivity options) and informs the app and/or user directly, e.g. with an acoustical notification. Alternatively, the app may either observe the sound environment itself using a microphone of the smartphone and/or poll the hearing device regularly to detect a suitable moment to ask the user if he wants to try out an advanced feature now. The app may provide or have access to other data such as time of day, agenda data from a calendar, circadian rhythm to further determine an appropriate moment to ask the user for a response.

**[0035]** In a further embodiment of the method the user may manually try out benefits by switching features on and off at some suitable time for him. The app may then inform the user at such a moment if the advanced feature is currently in use and thus provides a potential benefit or not.

**[0036]** In a further embodiment the proposed method may be part of a (self-)fitting process, where the final buying decision and configuration of the hearing device with the user selected advanced features happens entirely via the app running on the smartphone without a PC-based fitting software being involved, in particular this process is performed online, e.g. via the Internet.

## Claims

1. A method for evaluating an individual hearing benefit of a hearing device feature, comprising:

- a) providing at least one first hearing device feature in a hearing device;
- b) providing at least one second hearing device feature in the hearing device;
- c) classifying a current hearing situation, the current hearing situation being associated with a current acoustic environment;
- d) selecting the at least one second hearing device feature;
- e) applying the selected at least one second hearing device feature for processing an audio signal;
- f) providing the processed audio signal to an output transducer of the hearing device;
- g) indicating to the user that the at least one second hearing device feature is currently being applied; and
- h) providing control means for the user to switch off and on an effect of the at least one second hearing device feature,

#### characterized in that

- said classifying the current hearing situation is performed automatically by the hearing device,
- said selecting the at least one second hearing device feature is performed automatically dependent on the classified hearing situation and is performed by the hearing device, and **in that**
- the method further comprises estimating a hearing benefit provided by the at least one second hearing device feature in the current hearing situation and performing said indicating of step g) only under the condition that the estimated hearing benefit is above a certain pre-determined threshold.

#### 2. The method of claim 1, wherein at least one of:

- indicating that the at least one second hearing device feature is currently being applied;
- the control means for switching off and on an effect of the at least one second hearing device feature,

is provided to the user by means of a separate, auxiliary device, such as for instance a remote control unit or a smartphone.

#### 3. The method of claim 1 or 2, wherein classifying the current hearing situation comprises determining different sound types and/or determining different connectivity settings, such as for instance determining whether the audio signal is derived from at least one microphone of the hearing device and/or from a signal received by the hearing device.

#### 4. The method of one of claims 1 to 3, further compris-

ing requesting from the user a response indicative of the individual hearing benefit provided by the at least one second hearing device feature to the user.

#### 5. The method of claim 4, wherein as part of the step of requesting, the user is provided with one or more questions, for instance via a display on the auxiliary device or via the output transducer of the hearing device.

#### 6. The method of claim 5, wherein the auxiliary device monitors the current hearing situation, for instance based on a sound signal pick-up by the at least one microphone of the hearing device or a microphone located at the auxiliary device.

#### 7. The method of one of claims 1 to 6, further comprising determining if it is potentially disturbing to provide an indication to the user if the at least one second hearing device feature has been selected, based on information, such as the number of responses already provided by the user indicative of the individual hearing benefit provided by the at least one second hearing device feature, the time of day, calendar data, motion activity data, a circadian rhythm, or a biorhythm, in particular available to and/or determined by the auxiliary device, and not providing the indication to the user if it has been determined to be potentially disturbing.

#### 8. The method of one of claims 4 to 7, wherein as part of responding, the user inputs data into the hearing device or the auxiliary device, e.g. via a user interface, or provides a voice input, which is for instance picked-up by the microphone of the hearing device or a microphone of the auxiliary device.

#### 9. The method of one of claims 4 to 8, wherein the user response is stored as user response data in the hearing device or in the auxiliary device or transferred from the auxiliary device to a remote storage device such as a server, for instance cloud storage.

#### 10. The method of claim 9, further comprising retrieving the user response data stored during initially operating the hearing device, for instance from the hearing device or the auxiliary device or the remote storage device, by a fitting software or a client management software or a web application or an app running on the auxiliary device, such as an app for a smartphone.

#### 11. The method of one of claims 4 to 10, further comprising, in particular as part of a further fitting process, at least one of:

- presenting an overview of the user response data stored during initially operating the hearing

device;

- analysing the user response data stored during initially operating the hearing device;
- interpreting the user response data stored during initially operating the hearing device;
- determining an individual hearing benefit for the at least one second hearing device feature from the user response data associated with the at least one second hearing device feature from the user response data stored during initially operating the hearing device.

12. The method of claim 11, further comprising configuring the hearing device such that the at least one second hearing device feature is permanently removed or permanently deactivated or is made permanently available.

13. The method of claim 12, wherein configuring the hearing device is dependent on at least one of:

- the determined individual hearing benefit for the at least one second hearing device feature;
- a selection of the at least one second hearing device feature by an audiologist or the user of the hearing device, for instance in a fitting software or a client management software or a web application or an app running on the auxiliary device, such as an app for a smartphone;
- performing a financial transaction, for instance by the user;
- providing a passkey or an activation code to the hearing device.

14. The method of one of claims 1 to 13, wherein the method is part of a self-fitting or of an online fitting process.

15. The method of one of claims 1 to 14, wherein the at least one second hearing device feature comprises one of:

- highly directive and/or adaptive beamforming;
- adaptive noise cancelling;
- wind noise cancelling;
- automatic occlusion cancelling;
- frequency transposition/compression;
- binaural processing, wherein the hearing device is worn at a left ear and a second hearing device is worn at a right ear of the user, such as:

- providing the sound of a remote talker, e.g. originating from a far-end telephone, to the left and the right ear of the user;
- binaural wind noise cancelling;
- automatic listening, e.g. beamsteering, to the side or back when a relevant talker is detected there;

- providing many different, e.g. more than 3, automatically selectable hearing programs or signal processing configurations adapted for many different, e.g. more than 3, sound types or classes;
- audio streaming of at least one of a telephone, a television, a media player, a public address, and an alarm signal to the hearing device.

## Patentansprüche

1. Verfahren zum Bewerten eines individuellen Hörnutzens einer Hörgerätefunktion, umfassend:

- a) Bereitstellen mindestens einer ersten Hörgerätefunktion in einem Hörgerät;
- b) Bereitstellen mindestens einer zweiten Hörgerätefunktion im Hörgerät;
- c) Klassifizieren einer aktuellen Hörsituation, wobei die aktuelle Hörsituation mit einer aktuellen akustischen Umgebung verbunden ist;
- d) Auswählen der mindestens einen zweiten Hörgerätefunktion;
- e) Anwenden der ausgewählten mindestens einen zweiten Hörgerätefunktion zum Verarbeiten eines Audiosignals;
- f) Bereitstellen des verarbeiteten Audiosignals an einen Ausgangswandler des Hörgeräts;
- g) Hinweisen des Benutzers darauf, dass die mindestens eine zweite Hörgerätefunktion derzeit angewendet wird; und
- h) Bereitstellen von Steuermitteln für den Benutzer, um eine Wirkung der mindestens einen zweiten Hörgerätefunktion aus- und einzuschalten,

## dadurch gekennzeichnet, dass

- das Klassifizieren der aktuellen Hörsituation automatisch durch das Hörgerät erfolgt,
- das Auswählen der mindestens einen zweiten Hörgerätefunktion automatisch in Abhängigkeit von der klassifizierten Hörsituation erfolgt und vom Hörgerät durchgeführt wird, und dass
- das Verfahren weiter umfasst das Schätzen eines Hörnutzens, der die mindestens eine zweite Hörgerätefunktion in der aktuellen Hörsituation bietet, und das Ausführen des Hinweisens von Schritt g) nur unter der Bedingung, dass der geschätzte Hörnutzen über einem vorbestimmten Schwellenwert liegt.

2. Verfahren nach Anspruch 1, wobei mindestens eines von:

- Hinweisen darauf, dass die mindestens eine zweite Hörgerätefunktion derzeit angewendet

wird;

- die Steuermittel zum Aus- und Einschalten einer Wirkung der mindestens einen zweiten Hörgerätefunktion,

dem Benutzer mittels eines separaten Hilfsgeräts, wie z.B. einer Fernbedienung oder einem Smartphone, zur Verfügung gestellt wird.

3. Verfahren nach Anspruch 1 oder 2, wobei das Klassifizieren der aktuellen Hörsituation das Bestimmen verschiedener Klangtypen und/oder das Bestimmen unterschiedlicher Verbindungseinstellungen umfasst, wie z.B. das Bestimmen, ob das Audiosignal von mindestens einem Mikrofon des Hörgeräts und/oder von einem vom Hörgerät empfangenen Signal abgeleitet wird.
4. Das Verfahren nach einem der Ansprüche 1 bis 3, weiter umfassend das Anfordern einer Antwort vom Benutzer, die auf den individuellen Hörmutzen hinweist, der die mindestens eine zweite Hörgerätefunktion dem Benutzer bietet.
5. Verfahren nach Anspruch 4, wobei dem Benutzer im Rahmen des Schritts des Anforderns eine oder mehrere Fragen gestellt werden, beispielsweise über eine Anzeige am Hilfsgerät oder über den Ausgangswandler des Hörgeräts.
6. Verfahren nach Anspruch 5, wobei das Hilfsgerät die aktuelle Hörsituation überwacht, beispielsweise basierend auf einer Tonsignalaufnahme des mindestens einen Mikrofons des Hörgeräts oder eines Mikrofons am Hilfsgerät.
7. Verfahren nach einem der Ansprüche 1 bis 6, weiter umfassend das Feststellen, ob es potenziell störend ist, dem Benutzer einen Hinweis zu geben, ob die mindestens eine zweite Hörgerätefunktion ausgewählt wurde, basierend auf Informationen, wie der Anzahl der vom Benutzer bereits gegebenen Antworten, die auf den individuellen Hörmutzen hinweisen, der die mindestens eine zweite Hörgerätefunktion bietet, die Tageszeit, Kalenderdaten, Bewegungsaktivitätsdaten, ein zirkadianer Rhythmus oder ein Biorhythmus, die insbesondere dem Hilfsgerät zur Verfügung steht und/oder von diesem bestimmt wird, und dem Benutzer den Hinweis nicht zu geben, wenn festgestellt wurde, dass dieser potenziell störend ist.
8. Verfahren nach einem der Ansprüche 4 bis 7, wobei der Benutzer im Rahmen der Antwort Daten in das Hörgerät oder das Hilfsgerät eingibt, z.B. über eine Benutzeroberfläche, oder eine Spracheingabe macht, die beispielsweise vom Mikrofon des Hörgeräts oder einem Mikrofon des Hilfsgeräts aufgenommen

men wird.

9. Verfahren nach einem der Ansprüche 4 bis 8, wobei die Benutzerantwort als Benutzerantwortdaten im Hörgerät oder im Hilfsgerät gespeichert oder vom Hilfsgerät an eine entfernte Speichervorrichtung wie einen Server, beispielsweise einen Cloud-Speicher übertragen wird.
10. Verfahren nach Anspruch 9, weiter umfassend das Abrufen der beim erstmaligen Betrieb des Hörgeräts gespeicherten Benutzerantwortdaten, beispielsweise von dem Hörgerät oder dem Hilfsgerät oder der entfernten Speichervorrichtung, durch eine Anpasssoftware oder eine Kundenverwaltungssoftware oder eine Webanwendung oder eine auf dem Hilfsgerät ausgeführte App, wie z.B. eine App für ein Smartphone.
11. Verfahren nach einem der Ansprüche 4 bis 10, weiter umfassend, insbesondere im Rahmen eines weiteren Anpassverfahrens, mindestens eines von:
  - Darstellen einer Übersicht über die beim ersten Betrieb des Hörgeräts gespeicherten Benutzerreaktionsdaten;
  - Analysieren der benutzerseitigen Reaktionsdaten, die während des ersten Betriebs des Hörgeräts gespeichert wurden;
  - Interpretieren der beim ersten Betrieb des Hörgeräts gespeicherten Benutzerreaktionsdaten;
  - Bestimmen eines individuellen Hörmutzens für die mindestens eine zweite Hörgerätefunktion aus den Benutzerantwortdaten, die mit der mindestens einen zweiten Hörgerätefunktion verknüpft sind, aus den Benutzerantwortdaten, die während des ersten Betriebs des Hörgeräts gespeichert wurden.
12. Verfahren nach Anspruch 11, weiter umfassend das Konfigurieren des Hörgeräts so, dass die mindestens eine zweite Hörgerätefunktion dauerhaft entfernt oder dauerhaft deaktiviert oder dauerhaft zur Verfügung gestellt wird.
13. Verfahren nach Anspruch 12, wobei das Konfigurieren des Hörgeräts von mindestens einem der folgenden abhängig ist:
  - dem ermittelten individuellen Hörmutzen für die mindestens eine zweite Hörgerätefunktion;
  - eine Auswahl der mindestens einen zweiten Hörgerätefunktion durch einen Audiologen oder den Benutzer des Hörgeräts, z.B. in einer Anpasssoftware oder einer Kundenverwaltungssoftware oder einer Webanwendung oder einer App, die auf dem Hilfsgerät ausgeführt wird, z. B. einer App für ein Smartphone;



- Durchführen einer Finanztransaktion, z.B. durch den Benutzer;
  - Bereitstellen eines Passschlüssels oder eines Aktivierungs-codes für das Hörgerät.
14. Verfahren nach einem der Ansprüche 1 bis 13, wobei das Verfahren Teil eines Selbstanpassverfahrens oder eines Online-Anpassverfahrens ist.
15. Verfahren nach einem der Ansprüche 1 bis 14, wobei die mindestens eine zweite Hörerätfunktion eines von Folgendem umfasst:
- hoch gerichtete und/oder adaptive Strahlformung;
  - adaptive Geräuschunterdrückung;
  - Windgeräuschunterdrückung;
  - automatische Okklusionsunterdrückung;
  - Frequenztransposition/Kompression;
  - binaurale Verarbeitung, bei der das Hörgerät an einem linken Ohr und ein zweites Hörgerät an einem rechten Ohr des Benutzers getragen wird, wie zum Beispiel:
  - Bereitstellen des Klangs eines entfernten Sprechers, z.B. von einem entfernten Telefon ausgehend, am linken und rechten Ohr des Benutzers;
  - binaurale Windgeräuschunterdrückung;
  - automatisches Hören, z.B. Strahlsteuerung, zur Seite oder nach hinten, wenn dort ein relevanter Sprecher erkannt wird;
  - Bereitstellen vieler verschiedener, z.B. mehr als 3, automatisch wählbarer Hörprogramme oder Signalverarbeitungskonfigurationen, die für viele verschiedene, z.B. mehr als 3, Klangtypen oder -Klassen angepasst sind;
  - Audio-Streaming von mindestens einem von einem Telefon, einem Fernseher, einem Mediaplayer, einer Durchsage und einem Alarmsignal an das Hörgerät.

## Revendications

1. Procédé pour évaluer un bienfait auditif individuel d'une caractéristique de dispositif auditif, consistant à :
- a) fournir au moins une première caractéristique de dispositif auditif dans un dispositif auditif ;
  - b) fournir au moins une deuxième caractéristique de dispositif auditif dans le dispositif auditif ;
  - c) classier une situation auditive actuelle, la situation auditive actuelle étant associée à un environnement acoustique actuel ;
  - d) sélectionner la au moins une deuxième ca-

- ractéristique de dispositif auditif ;
- e) appliquer la au moins une deuxième caractéristique de dispositif auditif sélectionnée pour traiter un signal audio ;
- f) fournir le signal audio traité à un transducteur de sortie du dispositif auditif ;
- g) indiquer à l'utilisateur que la au moins une deuxième caractéristique de dispositif auditif est actuellement appliquée ; et
- h) fournir un moyen de commande pour que l'utilisateur puisse désactiver et activer un effet de la au moins une deuxième caractéristique de dispositif auditif ;

## caractérisé en ce que

- ladite classification de la situation auditive actuelle est effectuée automatiquement par le dispositif auditif,
- ladite sélection de ladite au moins une deuxième caractéristique de dispositif auditif est effectuée automatiquement en fonction de la situation auditive classifiée et est réalisée par le dispositif auditif, et en ce que
- le procédé consiste en outre à estimer un bienfait auditif fourni par la au moins une deuxième caractéristique de dispositif auditif dans la situation auditive actuelle, et à réaliser ladite indication de l'étape g) uniquement à la condition que le bienfait auditif estimé soit supérieur à un certain seuil prédéterminé.

2. Procédé selon la revendication 1, dans lequel au moins une des étapes parmi :

- l'indication selon laquelle la au moins une deuxième caractéristique de dispositif auditif est appliquée ;
- le moyen de commande pour désactiver et activer un effet de la au moins une deuxième caractéristique de dispositif auditif,

est fournie à l'utilisateur par le biais d'un dispositif auxiliaire séparé, comme par exemple une télécommande ou un smartphone.

3. Procédé selon la revendication 1 ou 2, dans lequel la classification de la situation auditive actuelle consiste à déterminer différents types de sons et/ou à déterminer différents paramètres de connectivité, comme par exemple déterminer si le signal audio provient d'au moins un microphone du dispositif auditif et/ou d'un signal reçu par le dispositif auditif.
4. Procédé selon l'une des revendications 1 à 3, consistant en outre à demander à l'utilisateur une réponse indiquant le bienfait auditif individuel fourni à l'utilisateur par la au moins une deuxième caracté-

ristique de dispositif auditif.

5. Procédé selon la revendication 4, dans lequel, dans le cadre de l'étape consistant à questionner l'utilisateur, ce dernier reçoit une ou plusieurs questions, par exemple via un écran sur le dispositif auxiliaire ou via le transducteur de sortie du dispositif auditif. 5
6. Procédé selon la revendication 5, dans lequel le dispositif auxiliaire surveille la situation auditive actuelle, par exemple sur la base d'un signal sonore capté par le au moins un microphone du dispositif auditif ou par un microphone situé au niveau du dispositif auxiliaire. 10
7. Procédé selon l'une des revendications 1 à 6, consistant en outre à déterminer s'il est potentiellement dérangeant de fournir une indication à l'utilisateur si la au moins une deuxième caractéristique de dispositif auditif a été sélectionnée, sur la base d'informations, telles que le nombre de réponses déjà fournies par l'utilisateur indiquant le bienfait auditif individuel fourni par la au moins une deuxième caractéristique de dispositif auditif, le moment de la journée, les données de calendrier, les données d'activité de mouvement, le rythme circadien ou le biorhythme, en particulier disponible à et/ou déterminé par le dispositif auditif, et à ne pas fournir l'indication à l'utilisateur si une telle information a été déterminée comme étant potentiellement dérangeante. 15 20 25 30
8. Procédé selon l'une des revendications 4 à 7, dans lequel, dans le cadre de la réponse, l'utilisateur entre des données dans le dispositif auditif ou dans le dispositif auxiliaire, par exemple via une interface utilisateur, ou fournit une entrée vocale qui est par exemple captée par le microphone du dispositif auditif ou par un microphone du dispositif auxiliaire. 35
9. Procédé selon l'une des revendications 4 à 8, dans lequel la réponse de l'utilisateur est mémorisée sous la forme de données de réponse d'utilisateur dans le dispositif auditif ou dans le dispositif auxiliaire, ou est transférée depuis le dispositif auxiliaire vers un dispositif de stockage distant, comme un serveur, par exemple un stockage sur le cloud. 40 45 50
10. Procédé selon la revendication 9, consistant en outre à récupérer les données de réponse d'utilisateur stockées pendant le fonctionnement initial du dispositif auditif, par exemple depuis le dispositif auditif ou le dispositif auxiliaire ou depuis le dispositif de stockage distant, par un logiciel d'ajustement ou un logiciel de gestion de la clientèle ou une application web ou encore une application fonctionnant sur le dispositif auxiliaire, comme une application pour smartphone. 55

11. Procédé selon l'une des revendications 4 à 10, consistant en outre, en particulier dans le cadre d'un autre processus d'ajustement, à effectuer au moins l'une des actions suivantes :

- présenter un aperçu des données de réponse d'utilisateur stockées pendant le fonctionnement initial du dispositif auditif ;
- analyser les données de réponse d'utilisateur stockées pendant le fonctionnement initial du dispositif auditif ;
- interpréter les données de réponse d'utilisateur stockées pendant le fonctionnement initial du dispositif auditif ;
- déterminer un bienfait auditif individuel pour la au moins une deuxième caractéristique de dispositif auditif à partir des données de réponse d'utilisateur associées à la au moins une deuxième caractéristique de dispositif auditif à partir des données de réponse d'utilisateur stockées pendant le fonctionnement initial du dispositif auditif.

12. Procédé selon la revendication 11, consistant en outre à configurer le dispositif auditif de façon à ce que la au moins une deuxième caractéristique de dispositif auditif soit définitivement supprimée ou soit désactivée en permanence ou soit disponible en permanence. 25 30

13. Procédé selon la revendication 12, dans lequel la configuration du dispositif auditif dépend d'au moins un des éléments suivants :

- le bénéfice auditif individuel déterminé pour la au moins une deuxième caractéristique de dispositif auditif ;
- la sélection de la au moins une deuxième caractéristique de dispositif auditif par un audiologiste ou par l'utilisateur du dispositif auditif, par exemple dans un logiciel d'ajustement ou un logiciel de gestion de la clientèle ou une application web ou une application fonctionnant sur le dispositif auxiliaire, comme une application pour smartphone ;
- la réalisation d'une transaction financière, par exemple par l'utilisateur ;
- la fourniture d'une clé d'accès ou d'un code d'activation au dispositif auditif.

14. Procédé selon l'une des revendications 1 à 13, dans lequel le procédé fait partie d'un processus d'auto-ajustement ou d'un processus d'ajustement en ligne.

15. Procédé selon l'une des revendications 1 à 14, dans lequel la au moins une deuxième caractéristique de dispositif auditif comprend l'un des éléments suivants :

- génération de faisceaux hautement directif et/ou adaptatif ;
- suppression adaptative du bruit ;
- suppression binaurale du bruit du vent ;
- suppression de l'occlusion automatique ; 5
- transposition/compression de la fréquence ;
- traitement binaural, dans lequel le dispositif auditif est porté au niveau de l'oreille gauche et un deuxième dispositif auditif est porté au niveau de l'oreille droite de l'utilisateur, de façon à : 10

- amener le son d'un interlocuteur distant, par ex. provenant d'un téléphone éloigné, à l'oreille gauche et à l'oreille droite de l'utilisateur ; 15
- permettre la suppression binaurale du bruit du vent ;
- permettre l'écoute automatique, par ex. par faisceau, sur le côté ou l'arrière lorsqu'un interlocuteur y est détecté ; 20
- fournir plusieurs, par exemple plus de 3 programmes auditifs différents, sélectionnables automatiquement, ou plusieurs configurations de traitement de signal adaptés pour plusieurs, par exemple plus de 3, types ou catégories de sons différents ; 25
- permettre la transmission audio d'au moins un élément parmi un téléphone, une télévision, un lecteur multimédia, une sonorisation et un signal d'alarme au dispositif auditif. 30

35

40

45

50

55

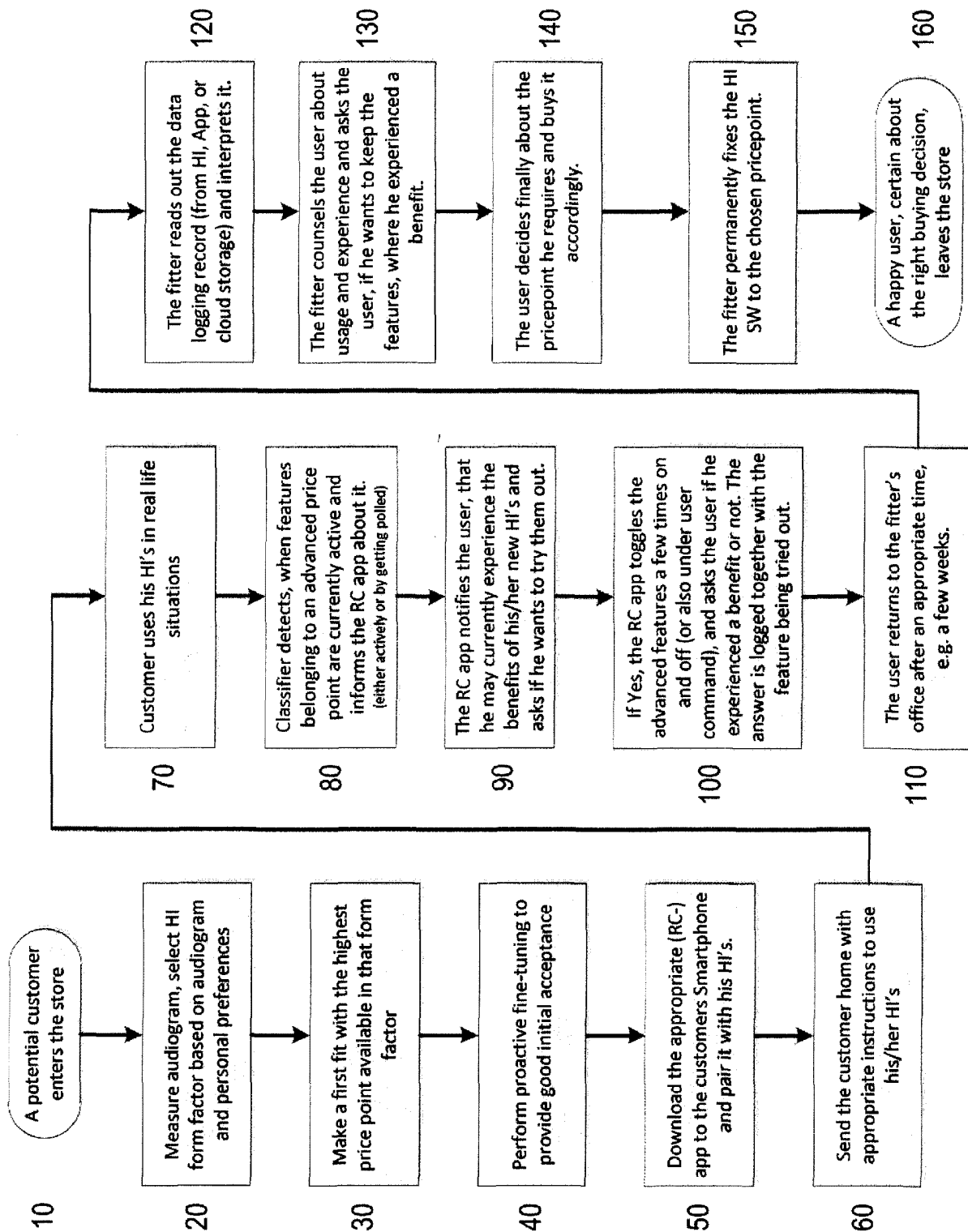


Fig. 1

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- US 20090196448 A1 [0003]