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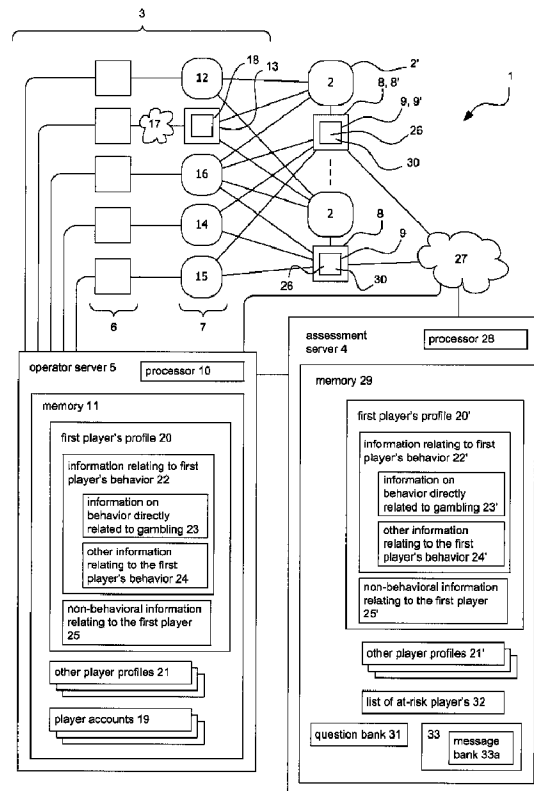
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(54) **Titre : SYSTEME ET METHODE DE DETERMINATION ET DE MODIFICATION DE COMPORTEMENT**

(54) **Title: SYSTEM AND METHOD FOR IDENTIFYING AND MODIFYING BEHAVIOR**



(57) **Abrégé/Abstract:**

An apparatus, such as a server, configured to receive information relating to a first user's behavior and to analyze this to identify one or more behavioral risk indicators comprising statistically significant behavioral changes. The apparatus is also configured to



(57) Abrégé(suite)/Abstract(continued):

determine one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users. Moreover, based on the one or more determined similarities, the apparatus is configured to determine a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users, and to initiate one or more actions configured to cause the first user to change their behavior in the risk activity.

Abstract

An apparatus, such as a server, configured to receive information relating to a first user's behavior and to analyze this to identify one or more behavioral risk indicators comprising statistically significant behavioral changes. The apparatus is also configured to determine one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users. Moreover, based on the one or more determined similarities, the apparatus is configured to determine a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users, and to initiate one or more actions configured to cause the first user to change their behavior in the risk activity.

SYSTEM AND METHOD FOR IDENTIFYING AND MODIFYING BEHAVIOR

FIELD

This specification relates generally to a system and method for identifying and modifying behavior in a risk activity.

5 BACKGROUND

The popularity of gambling is increasing due to factors such as increased gambling expansion though the liberalisation and regulation of gambling markets, as well as the proliferation of new electronic consumer channels for participation. These increased opportunities to participate serve to heighten concerns about the potential for gambling related harm.

10 Likewise, there is also increasing concerns with regards to harm minimization and consumer protection in other industries such as social gaming, trading and investment, alcohol, tobacco and food.

SUMMARY

In an embodiment, a method comprises: receiving information relating to a first user's

15 behavior; analyzing the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes; determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; based on the one or more determined similarities, determining a likelihood of the first user exhibiting a behavior in a risk activity

20 which was exhibited by the one or more second users; and initiating one or more actions configured to cause the first user to change their behavior in the risk activity.

Determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users may comprise

determining similarities between the identified one or more behavioral risk indicators and behavioral risk indicators associated with the one or more second users.

Moreover, the method may further comprise receiving non-behavioral information relating to the first user; and determining one or more similarities between the first user's non-behavioral information and stored non-behavioral information relating to the one or more second users. Furthermore, determining the likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users may also be based on the determined one or more similarities between the first user's non-behavioral information and non-behavioral information relating the one or more second users.

10 Analyzing the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes may comprise: identifying a group of the one or more second users with similar behavior to the first user; and identifying behavioral risk indicators comprising one or more statistically significant differences in the behavior of the first user, compared to the average behavior of the group of second users.

15 The method may comprise enabling provision to the first user of one or more questions and receiving answers from the first user; and determining one or more similarities between the first user's question responses and stored question responses of one or more second users.

Initiating the one or more actions may comprise enabling the first user to be provided with one or more messages configured to cause the first user to change their behavior in the risk activity. Moreover, the one or more messages and/or other actions may be configured based on the determined likelihood of the first user exhibiting the behavior in the risk activity and/or the one or more behavioral risk indicators.

The method may further comprise the first user, in response to the one or more actions, changing their behavior in the risk activity to differ from the behaviour in the risk activity which was exhibited by the one or more second users.

In another embodiment, a method of therapy for an individual with a problem gambling disorder comprises: receiving information relating to a first user's behavior; analyzing the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes; determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; based on the one or more determined similarities, determining a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and initiating one or more actions configured to cause the first user to change their behavior in the risk activity.

In another embodiment, an apparatus comprises at least one processor; and at least one memory including computer program code; wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to perform: receiving information relating to a first user's behavior; analyzing the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes; determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; based on the one or more determined similarities, determining a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and initiating one or more actions configured to cause the first user to change their behavior in the risk activity.

Determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users may comprise determining similarities between the identified one or more behavioral risk indicators and behavioral risk indicators associated with the one or more second users.

Moreover, the at least one memory and the computer program code may be configured to, with the at least one processor, cause the apparatus to perform receiving non-behavioral information relating to the first user; and determining one or more similarities between the

first user's non-behavioral information and stored non-behavioral information relating the one or more second users. Furthermore, determining the likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users may also be based on the determined one or more similarities between the first user's non-behavioral information and non-behavioral information relating the one or more second users.

Analyzing the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes may comprise: identifying a group of the one or more second users with similar behavior to the first user; and identifying behavioral risk indicators comprising one or more statistically significant differences in the behavior of the first user compared to the average behavior of the group of second users.

The at least one memory and the computer program code may be configured to, with the at least one processor, cause the apparatus to perform: enabling provision to the first user of one or more questions and receiving answers from the first user; and determining one or more similarities between the first user's question responses and stored question responses of one or more second users.

Initiating the one or more actions may comprise enabling the first user to be provided with one or more messages configured to cause the first user to change their behavior in the risk activity. Moreover, the at least one memory and the computer program code may be configured to, with the at least one processor, cause the apparatus to configure the one or more messages and/or other actions based on the determined likelihood of the first user exhibiting the behavior in the risk activity and/or the one or more behavioral risk indicators.

Hence, in accordance with a broad aspect, there is a method provided by a computer and comprising: receiving, by a processing device, information relating to a first user's behavior; analyzing, by the processing device, the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes; in response

to identifying the one or more behavioral risk indicators, determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; based on the one or more determined similarities, determining a likelihood of the first user exhibiting a behavior in a risk activity
5 which was exhibited by the one or more second users; and initiating one or more actions configured to cause the first user to change their behavior in risk activity.

In accordance with another broad aspect, there is provided an apparatus comprising a processor and a memory comprising computer program code, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus at least
10 to perform: receiving information relating to a first user's behavior; analyzing, by the processor, the behavior information to identify one or more behavioral risk indicators comprising statistically significant behavioral changes; determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; based on the one or more determined similarities,
15 determining a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and initiating one or more actions configured to cause the first user to change their behavior in the risk activity.

In accordance with a further broad aspect, there is a method provided by a computer and comprising: receiving, by a processing device, information relating to a first user's behavior
20 of a first anonymous user; analyzing, by a processing device, the information to identify one or more first behavioral risk indicators indicative of statistically significant changes in behavior of the first anonymous user; determining one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; based on the one or more determined similarities, determining a likelihood of
25 the first anonymous user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and initiating one or more actions configured to cause the first anonymous user to change their behavior in the risk activity.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of example embodiments of the present invention, reference is now made to the following description taken in connection with the accompanying drawings in which:

- 5 Figure 1 is a schematic illustration of a system in which the likelihood of a gambler's betting activities becoming unsustainable is assessed;

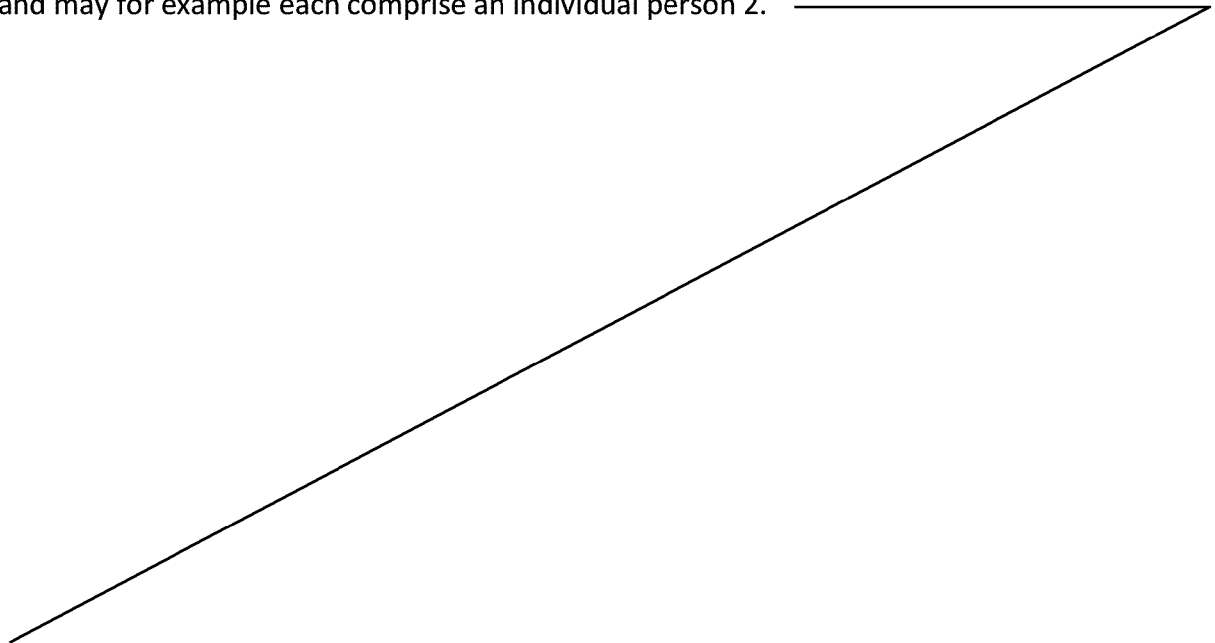
Figure 2 is a flow chart of functions performed by the assessment server of Figure 1;

Figure 3 is a flow chart of functions performed by the assessment server of Figure 1; and

Figure 4 illustrates operation of the system 1 of Figure 1 with regard to anonymous play.

10 **DETAILED DESCRIPTION OF EMBODIMENTS**

Variants, examples, and preferred embodiments of the invention are described hereinbelow. Referring to Figure 1, a system 1 is illustrated which assesses the behavior of one or more entities 2 engaging in gambling activities. The entities 2 are herein referred to as players 2 and may for example each comprise an individual person 2.



The system 1 comprises a gambling system 3 of a gambling operator and an assessment server 4. The gambling system 3 comprises an operator server 5, a plurality of service servers 6 and a plurality of respective gambling services 7. Via the service servers 6, the operator server 5 facilitates provision of the gambling services 7 to the players 2, and
5 receives information relating to each players' behavior as they use the gambling services 7. Each player 2 has access to a respective computing device 8, such as a smart phone 8, a tablet computer 8 or laptop computer 8, comprising a display screen 9. The assessment server 4 receives from the operator server 5 the information relating to the gambling behavior of each of the players 2. The assessment server 4 uses this information to assess
10 the current gambling behavior and determine likely future gambling behavior of each player 2. Moreover, if the assessment server 4 determines that a player 2 is likely to exhibit behaviors associated with problem gambling, then the assessment server initiates one or more actions, comprising enabling the player to be provided with one or more messages, configured to change the player's behaviors so as to avoid the behaviors associated with
15 problem gambling. A more detailed description of the system 1 is provided below.

The operator server 5 comprises a processor 10 and a memory 11. The configuration of the operator server 5 to perform functions described herein comprises configuration of the memory 11 and computer program code stored therein to cause the operator server 5 to
20 perform the functions.

The gambling services 7 comprise casino kiosks 12, electronic gaming machines (EGM) 13 and video lottery terminals (VLT) 13 linked to the operator server 5, internet gambling games and services 14 accessed by players via their respective computing devices 8, and
25 SMS, cellular and email based gambling services 15 accessed by players via their respective computing devices 8. Other types 16 of gambling services 6 are also possible, such as gambling services provided via Digital Television. One or more of the EGMs 13 and VLTs 13 are managed by their respective service server 6 over a distributed wireless network 17, such as a LAN or WAN. The EGMs 13 and VLTs 13 each comprise a display 18 for
30 communicating information to a player 2 making use of them.

The memory comprises a plurality of player accounts 19, comprising a player account 19 for each of the players 2 that make use, or have previously made use, of the gambling

services 7. A player's account 19 comprises administrative information regarding the player 2, such as registration information relating to the player's registration for use of the gambling services 7, information used to identify the player 2, financial information related to the player 2 and the player's responsible gambling settings. For example, the financial
5 information relating to the player 2 comprises information relating to how the player 2 deposits real money in their account 19, which includes information on the sources of deposits (e.g. credit cards, debit cards, etc) and any limits to these deposits. Moreover, the player's responsible gambling settings comprise information on any gambling limits or restrictions voluntarily set by the player 2 or instigated by the system 1, such as loss limits.

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The memory 11 comprises a plurality of player profiles 20, 21, wherein each player profile 20, 21 is associated with one of the one or more players 2 that make use, or have previously made use, of the gambling services 7. The player profile 20 of a first player 2' of the plurality of players 2 is illustrated, and is herein referred to as the first player's profile 20.

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As is illustrated with reference to the first player's profile 20, each player profile 20, 21 comprises information 22 relating to that player's behavior, comprising information 23 on behavior of the player that is directly related to gambling and other information 24 relating to the player's behavior. Moreover, each player profile 20, 21 comprises non-behavioral information 25 relating to the player.

20

For example, the information 23 on behavior of a player that is directly related to gambling may comprise:

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- information identifying which gambling services have been used by the player;
- information identifying which game types have been played by the player via the gambling services;
- the date, time, frequency and duration of each session of gambling by the player;
- the date, time, frequency and duration of each game played by the player within a session of gambling;
- the number, timing, frequency and size of bets made by the player;
- the number, timing, frequency and size of wins and/or losses experienced by the player;
- information identifying the financial deposit source used by the player for placing bets and the timing of any changes to this;

- information on the player's betting behavior using both money from the player's one or more deposits and any gifted or bonus money provided to the player by the gambling system 3;
- 5 ▪ information on instances of the player attempting to place bets which exceed the funds available to them through a chosen deposit source, resulting in a rejection of the bet by the deposit source;
- information on changes to the player's deposit limits
- information on changes by the player to their gambling limits such as their loss limit, or self-exclusion start/end date; and/or
- 10 ▪ information identifying the nature of bets made by the player, such as the timescale of bets made – for example, information indicating how long a bet made will take to conclude.

15 This information 23 is received by the operator server 5 in the course of a player's usage of the services. For example, when players 2 use the gambling services 7, their gambling behaviors are received and recorded by the operator server 5 in their respective player profiles 20, 21. The information 23 on behavior of a player 2 that is directly related to gambling may also in part be received at the operator server 5 from third party sources, such as from other gambling systems.

20 Moreover, the other information 24 relating to a player's behavior may for example comprise the player's credit score, and/or information on variations in the player's credit score over time, and information on communications that have occurred between the player 2 and the gambling operator. For example, the information on communications
25 between the player 2 and the gambling operator may relate to communications via a range of mediums such as phone, email, website interactions, text message and conversations in person between staff of the gambling operator and the player. For example, the information on communications between the player and the gambling operator may
30 comprise information based on customer services telephone conversations, which may include information on the tone of the player's communication. The information on communications may also comprise click-stream information from the player's use of internet websites and services, including those of the gambling services 7, provided by the gambling operator 3.

The non-behavioral information 25 relating to a player may comprise for example demographic information such as the gender and date of birth of the player 2, information on the player 2 derived through social media, information identifying a marketing segment to which the player 2 has been determined as belonging to, information from medical
5 records of the player 2 (subject to the consent of the player) and/or question responses provided by the player 2 in response to questions provisioned to the player by the assessment server 4.

The operator server 5 is configured to provide a network portal 26, such as a webpage,
10 which is accessible by each of the one or more players 2 via a network 27 using the computing devices 8, 8' of the players. The network portal 26 enables communications with players 2 and allows players 2 to set and adjust parameters of their player accounts stored on the gambling system 3, such as setting self-imposed betting limits or initiating a self-exclusion period. When a player 2 alters these gambling parameters, this behavior is
15 stored in the player's respective player profile 20, 21 as information 23 on behavior directly related to gambling.

The operator server 5 is configured to communicate with the assessment server 4. Moreover, the operator server 5 is configured to send a copy 20', 21' of each of the player
20 profiles 20, 21 to the assessment server 4, once this data is recorded at the operator server 5.

The assessment server 4 comprises a processor 28 and a memory 29. The configuration of the assessment server 4 to perform functions described herein comprises configuration of
25 the memory 29 and computer program code stored therein to cause the assessment server 4 to perform the functions.

The assessment server 4 is configured to provide a network portal 30 that is fully integrated with the operator network portal 26. For example, this integration may be
30 achieved using application programming interfaces. The network portal 30 provided by the assessment server 4 facilitates communication between the assessment server 4 and each player 2, via the computing device 8 of each player.

The memory 29 comprises the player profiles 20', 21' received from the operator server 5.

The memory 29 also comprises a question bank 31 of questions for provision to players 2 via the network portal 26, 30 in order to assess their gambling behavior and whether they are experiencing harm as a result of their gambling. The questions may, for example, relate to a player's 2 perception of their gambling behavior, their perception of the personal and social consequences of their gambling behavior and their perception of the amount of time they spend gambling. In other words, the questions can provide a self-test or self-assessment to enable the assessment server 4 to capture the views of a player 2 in relation to whether they are potentially experiencing harm from their gambling activities. For example, the questions may be those of one of the standard assessment used by clinicians, such the Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition (DSM-V), the Problem Gambling Severity Index (PGSI), the Canadian Problem Gambling Index (CPGI), the South Oaks Gambling Screen (SOGS), or any other proprietary or variations on these or other self tests or assessments. The network portal 26, 30 is configured to allow a player 2 to answer the questions via a graphic user interface, displayed on the display 9 of their computing devices 8, such that the player's answers are sent back to the assessment server 4. Question answers received by the assessment server 4 from each player 2 are stored as non-behavioral information 25 relating to a player in the player's respective player profile 20', 21', and are sent to the operator server 5 for duplicate storage in the player's profile 20, 21 there.

The memory 29 also comprises a list 32 of players 2 considered to be at-risk of having or developing a gambling problem. These players are referred to herein as at-risk players. Self-exclusion is an extreme form of pre-commitment, in which gamblers who believe that they have a problem can voluntarily bar themselves from being able to use one or more gambling services provided by a gambling operator for a period of time. The system 1 uses the act of self-exclusion by a player as a proxy, or indicator, for the player being at-risk. If a player 2 self-excludes, this is recorded by the assessment server 4, and information indicating the player 2, such as information indicating the player's profile 20', 21', is entered into the list of at-risk players 32.

The memory 29 also comprises an action bank 33 configured to facilitate the initiation by the assessment server 4 of one or more actions configured to change a player's behaviors so as to avoid the player self-excluding. In this respect, the action bank 33 comprises a message bank 33a of messages for provision to players 2 via the network portal 26, 30.

5 The messages are intended to educate players 2 regarding their respective gambling behaviors and to thereby therapeutically encourage help them to make informed decisions regarding future gambling. For example, the messages may include tips to enable players 2 to modify their play should it show signs of developing towards self-exclusion. In this respect the message bank 33a comprises a spectrum of messages each tailored to address
10 different determined situations concerning a player's 2 gambling behavior.

Referring to Figure 2, operation of the system 1 of Figure 1 with regard to the first player 2' is illustrated. The same operation is performed by the system 1 for each of the players 2.

15 At step 2.1, the assessment server 4 receives from the operator server 5, and stores a copy 20' of, the first player's profile 20. The assessment server 4 may already have in its memory 29 a first version of the first player's profile 20', received previously from the operator server 5. In this case, the information received from the operator server 5 at step 2.1 may be an update, comprising information relating to the first player 2' which was
20 determined subsequent to the provision of the first version to the assessment server 4.

The assessment server 4 can receive data related to the first player's profile 20 by different integration methods. For example this could be in real-time via an application programming interface. For instance, the operator server 5 may send information relating
25 to the first player's behavior as and when it occurs, or it may send this information periodically (e.g. every 5 minutes, hour, day, week, etc).

Step 2.2 comprises monitoring behavioral change. In more detail, at step 2.2 the assessment server 4 analyzes the information 22' relating to the first player's behavior,
30 comprising information 23' on behavior directly related to gambling and other information 24' relating to the first player's behavior, by looking for behavioral risk indicators comprising statistically significant behavioral changes considered to be associated with problem gambling. For example, the assessment server 4 may analyze the information 22'

relating to the first player's behavior to determine whether any of the behavioral risk indicators of Table 1 are present.

Table 1

Behavioral dimension	Behavioral risk indicator	Short description of considered significance of the risk indicator
Bet patterns	Increasing size of bets	Linked to an increasing need to gamble and to spend increasingly more money
	Increasing bet variability	Linked to loss-chasing and/or overconfidence
	Increasing bet frequency	Linked to an increasing need to gamble and/or tolerance
	Increase in ratio of post-loss bet size versus post-win bet size	Linked to loss-chasing
	Increase in ratio of post-loss bet frequency versus post-win bet frequency	Linked to loss-chasing
	Increase in ratio of short-term bets versus long-term bets	A potential sign of problem gambling and could be correlated to other risk factors e.g. increasing size of bets and/or increasing bet variability
	Significant size or number of wins early in a period of playing a new type of game	Problem gambling often results when a player wins a lot at the start of their betting on a new type of game
	High Theoretical Loss Risk	Linked to increasing need to gamble and spend on games of chance where the probability of the casino operator taking a higher proportion of stake is higher (e.g. return to player lower than 80%, for example) compared to other games.
Bet/spend patterns	Significant ratio between amount of money won early in a period of playing an new type of game to amount of money deposited	Problem gambling often results when a player wins a lot at the start of their betting on a new type of game
Spend patterns	Increasing number and/or of losses	Linked to negative financial consequences
	Increase in deposit required to finance gambling	Linked to unsustainable gambling
	Increasingly using credit to finance gambling	Linked to unsustainable gambling

Behavioral dimension	Behavioral risk indicator	Short description of considered significance of the risk indicator
	Decline in a player's credit score	Can be a sign of potentially problematic behavior, for example when combined with increasing use of credit to finance gambling and/or and increasing size of bets
	Changing to a different deposit source at the end of the month (e.g. from debit card to credit card)	Linked to excessive gambling, particularly if coupled with a increase in the deposit required to finance a player's gambling
	An increase in the frequency of deposit rejections	Deposit rejections can be a signal of someone trying to gamble beyond their financial means
	Decrease or removal of deposit and/or wager limits	Evidence that a player is needing to increase their gambling involvement from previous levels
	Self-exclusion history	Previous evidence of using cooling off and self-exclusion features could be an indication that the player has a gambling problem
Play session patterns	Increase in frequency of play sessions	Linked to an increasing need to gamble and/or tolerance
	Increase in total session time	Linked to pre-occupation with gambling
	Irrational behavior demonstrated in clickstream	For example, when a player presses "play" repeatedly while waiting for a system response
	Increase in the number of gaming verticals (e.g. lottery, casino, poker, bingo) played	Evidence suggests that problem gamblers often participate in multiple forms of gambling
	Increase game modes (e.g. internet gambling, land-based gambling) played	Evidence suggests that problem gamblers often participate in multiple game modes
	Increase in the amount of gambling taking place at night (e.g. between 11pm and 4am)	Evidence suggests there could be possible negative social consequences as a result of disruptive sleep patterns
Communication patterns	Increasing frequency of player interaction with customer services	Evidence suggests this is a sign of potential problem gambling behaviors
	Tonality Indicator	These are possible signs that someone is no longer gambling for fun and is experiencing negative consequences

Steps 2.3 and 2.4 comprise predicting events related to problem gambling.

At step 2.3 the assessment server 4 compares the first player's profile 20' with player profiles 21' of players listed 32 as being at-risk to determine whether similarities exist between the information 22' relating to the first player's behavior and the information relating to the behavior of the at-risk players. If similarities are identified, at step 2.4 the
5 assessment server 4 determines, based on the determined similarities, a probability that the first player 2' will go on to self-exclude.

In more detail, at steps 2.3 and 2.4, the assessment server 4 uses logistic regression in analyzing the information 22' relating to the first player's behavior against the information
10 relating to the behavior of players 2 listed 32 as being at-risk, and thereby determines an estimate of the likelihood of the first player 2' self-excluding.

At step 2.5, the assessment server 4 initiates one or more actions configured to change the first player's behavior, wherein the one or more actions comprise steps 2.6 and 2.7.
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At step 2.6, the assessment server 4 selects a message from the message bank 33a based on the determined likelihood that the first player 2' will self-exclude. At step 2.7 the assessment server 4 sends the selected message to the first player 2' via the network portal 26, 30. As a result, the message is displayed on the display 9' of the first player's device 8'
20 and viewed there by the first player 2'.

Many alternatives and variations of the embodiments described herein are possible. Example alternatives and variations are described below. In this regard, Figure 3 illustrates the method of Figure 2 modified to incorporate some of the variations described
25 below. Method steps of Figure 3 indicated by reference numerals 2.1 to 2.7 correspond to the method steps of Figure 2 indicated by the same reference numerals.

The above described displaying of messages to the first player 2' by sending messages to first player 2' may also comprise sending messages to the first player 2' via email or text
30 message (SMS) for display on the display 9' of the computing device 8' of the first player 2'. Moreover, messages may be sent to the first player 2', via the operator server 5, by displaying them on the display screens 18 of the EGMs 13 or VLTs 13. For example, the network portal 26, 30 may also be available to players 2 via the display screens 18 of the

EGMs 13 and VLTs 13 of the gambling system 3. Furthermore, messages may be sent to the first player 2' by displaying them on any web service, such as the internet gambling games and services 14, provided by the operator server 3, for viewing on the display screen 9' of the computing device 8' of the first player 2'.

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The assessment server 4 may only initiate the one or more actions at step 2.5 if it determines that the determined likelihood of the first player 2' self-excluding is above a certain threshold likelihood.

10 Although the method of Figure 2 has been described as using the information 22' relating to the first player's behavior, comprising information 23' on behavior directly related to gambling and other information 24' relating to the first player's behavior, the behavioral information 22' used may instead comprise only the information 23' on behavior directly related to gambling or only the other information 24' relating to the first player's behavior.

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Step 2.3 may comprise comparing the first player's profile 20' with player profiles 21' of player's listed 32 as being at-risk to determine whether similarities exist between the first player's 2' identified behavioral risk indicators and identified behavioral risk indicators of the at-risk players.

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The method of Figure 2 may further comprise, for example between steps 2.2 and 2.3, the assessment server 4 sending questions from the question bank 31 to the first player 2' via the network portal 26, 30, and the assessment server 4 then receiving the first player's question responses and storing these in the non-behavioral information 25' relating to the first player 2'. The sending of the questions to the first player 2' may occur automatically in response to identification of behavioral risk indicators at step 2.2.

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The sending of questions to a player 2 by the assessment server 4 may also or alternatively be initiated at any time voluntarily by the player, for example via an option to take a self-assessment quiz provided by the network portal 26, 30.

30

The assessment server may select specific questions from the question bank 31 based on the first player's 2' determined behavioral risk indicators.

Step 2.2 may further comprise assessing the question responses to determine one or more response risk indicators, relating to aspects of the question responses considered to be associated with unsustainable gambling behaviors. For example the one or more response risk indicators may take the form of a response risk score, such as that provided by the PGSI.

Furthermore, step 2.3 may comprise comparing the first player's profile 20' with player profiles 21' of player's listed 32 as being at-risk to determine whether similarities exist between the first player's 2' question responses and/or their identified response risk indicators and the question responses and/or identified response risk indicators of the at-risk players.

As illustrated by step 3.3 of Figure 3, the method of Figure 2 may further comprise the assessment server 4 comparing the first player's profile 20' with player profiles 21' of player's listed 32 as being at-risk to determine whether similarities exist between the non-behavioral information 25' relating to the first player 2' and the non-behavioral information of the at-risk players. For example, step 2.3 may include the identification of similarities between the first player's demographic information and demographic information of one or more of the at-risk players. Step 2.4 may then be based on the similarities determined at step 2.3 and step 2.4.

The method of Figure 2 may include, as illustrated by step 3.1 of Figure 3, the assessment server 4 identifying one or more of the other players 2 whose player profiles 21' share similarities with the first player's profile 9'. For example, this may comprise determining a category of player, based on certain parameters such as playing habits, to which the first player 2' and a number of the other players 2 belong. This may be achieved through the use of statistical techniques such as statistical classification.

Moreover, the method of Figure 2 may include, as illustrated by step 3.2 of Figure 3, the assessment server 4 comparing the first player's profile 20' with the profiles 21' of player's belonging to the same category to determine whether any statistically significant difference exist between the information 22' relating to the behavior of the first player and an average of the information relating to the behavior of each of the other players. For example, this

may comprise determining that a particular aspect of the first player's behavior, such as their betting intensity, is excessive compared to the average behavior of the other players. Such identified statistically significant differences resulting from this normative comparison are treated as behavioral risk indicators, and are referred to herein as peer-based behavioral risk indicators. For example, determining peer-based behavioral risk indicators may comprise determining which percentile the first player's 2' behaviors lie in within the distribution of behaviors of the other players of the same category. For instance, the first player's betting intensity behavior may be determined as being in the 99th percentile of betting intensity when compared to the betting intensity exhibited by the other players of the same category, and this excessive behavior relative to their category would be identified as a peer-based behavioral risk indicator.

The above described determining of behavioral risk indicators at step 2.2 may comprise utilisation or consideration of the absolute values of the behavioral parameters being analyzed for statistically significant changes over time, or of the absolute values of related behavioral parameters. Similarly, determining of behavioral risk indicators at steps 3.2 may comprise utilisation or consideration of the absolute values of the behavioral parameters being analyzed for statistically significant differences compared to corresponding behavioral parameters of other players, or of the absolute values of related behavioral parameters.

For example, determining a behavioral risk indicator at step 2.2 based on betting trajectory, that is to say, based on an identified statistically significant increase in the size of bets placed by the first player 2' over a period of time, may include consideration of the absolute values of the amount spent by the first player 2' over the calculation period to further validate the significance of the identified betting trajectory.

A similar principal can be used regarding other behavioral parameters, such as by including consideration of absolute amount of time spent gambling, the absolute amount of bets made or wagers placed.

In another example, determining a behavioral risk indicator at step 2.2 based on change in tonality of communications, that is to say, based on an identified statistically significant

change in the tonality interactions between the first player and call centre staff over a period of time, may include consideration of the number of interactions which took place during this period so as to further validate the identified change in tonality.

5 Moreover, determining a behavioral risk indicator at step 3.2 based on the first player's betting intensity, that is to say, based on an identified statistically significant difference in the betting intensity of the first player 2' over a period of time compared to the average behavior of other players of their category over a similar period of time, may include consideration of the absolute values of the amount spent by the first player 2' over the
10 calculation period to further validate the significance of the identified betting intensity difference.

Furthermore, step 2.3 may comprise comparing the first player's profile 20' with player profiles 21' of player's listed 32 as being at-risk to determine whether similarities exist
15 between peer-based behavioral risk indicators of the first player 2' and peer-based behavioral risk indicators of the at-risk players.

The method of Figure 2 may include the assessment server 4 determining a behavioral risk score for the first player 2' based on the first player's determined behavioral risk indicators
20 and/or on the first player's determined peer-based behavioral risk indicators.

The aforementioned automatic sending of questions to the first player 2' in response to the determination of behavioral risk indicators may comprise sending the questions only when the determined behavioral risk score for the first player 2' exceeds a certain threshold
25 score.

Moreover, the assessment server 4 may select specific questions from the question bank 31 based on the first player's 2' determined behavioral risk score.

30 Furthermore, step 2.3 may only occur if the determined behavioral risk score exceeds a certain threshold score. Moreover, step 2.3 may comprise determining similarities between the determined behavioral risk score of the first player 2' and determined behavioral risk scores of the player profiles 21' of listed 32 at-risk players.

The method of Figure 2 may also include the assessment server 4 determining an overall risk score for the first player 2' based on the first player's behavioral risk score, response risk score and/or the determined likelihood of the first player 2' self-excluding.

5 The method of Figure 2 may include the assessment server 4 performing the initiation of one or more actions of step 2.5 in response to identifying one or more behavioral risk indicators. In this case, the configuration of the one or more actions, such as the selection and/or configuration of the messages at step 2.6, may be based on the first player's 2' behavioral risk indicators, peer-based behavioral risk indicators and/or behavioral risk
10 score.

The method of Figure 2 may include the assessment server 4 performing the initiation of one or more actions of step 2.5 in response to identifying one or more similarities between the information relating to the first player's behavior and information relating to the
15 behavior of the listed 32 at-risk players. In this case, the configuration of the one or more actions, such as the selection and/or configuration of the messages at step 2.6, may be based on the first player's 2' behavioral risk indicators, peer-based behavioral risk indicators, behavioral risk score and/or the aforementioned determined similarities.

20 The configuration of the one or more actions of step 2.5, such as the selection of a message from the message bank 33a at step 2.6, may alternatively or additionally be based on the first player's 2' behavioral risk indicators, peer-based behavioral risk indicators, behavioral risk score, response risk indicator/score and/or their determined overall risk score.

25 For example, the following message may be selected from the message bank 33a when a behavioral risk indicator of a statistically significant increase in losses is identified, and when it is determined that there is a strong likelihood that the first player 2' will self-exclude in the near future:

30 "Did you know that your most recent gaming is significantly different to how you have typically played? Specifically, did you know that in your last few sessions you have been losing significantly larger amounts of money compared with how you typically bet?"

The message bank 33a may comprise multiple levels of messages. Moreover, the above description of selecting and sending a message may comprise selecting and sending one or more messages from a first level initially, and wherein these initial one or more messages may be followed in sequence by one or more messages from subsequent sequential
5 message levels. For example, a first level message may be configured to provide a player 2 with a risk rating, such as their determined behavioral risk score, response risk score, determined likelihood of self-excluding and/or overall risk score, and a broad description of the risk rating. Moreover, a second level message may be configured to provide the player 2 with more information explaining the risk rating provided in the first level
10 message, for example by highlighting the player's identified behavioral risk indicators. Furthermore, a third level message may be configured to cause the player 2 to address their identified risk behaviors by modifying their behavior. All the different levels of messages may provide links, such as hyperlinks, to other areas of the portal 26, 30 designed to help a player modify their behavior. For example, messages may provide links
15 to other responsible gambling features that the gambling operator or the gambling system 3 provides for the players 2, such as self-exclusion features and limit setting. For instance, the links may take a player 2 to areas of the player portal 26, 30 to allow the player to modify their player account parameters, such as by setting gambling limits.

20 Before sending a selected message, the assessment server 4 may further configure the message based for example on the same information upon which selection of the message took place. The messages for a player 2', 2 may also be personalised by the assessment server 4 using any other information from the player's profile 20', 21'.

25 Alternatively or additionally, selecting a message from the message bank 33a may comprise the assessment server 4 compiling a message based on an algorithm.

The one or more actions described above comprise the steps of selecting 2.6 and sending 2.7 one or more messages to the first player. However, step 2.5 may comprise initiating
30 one or more actions in addition to or instead of those of steps 2.6 and 2.7. For example, as illustrated by step 3.4 of Figure 3, the method of Figure 2 may include the actions of making or affecting one or more changes to services 7 and/or communications provided to the first player 2' by the gambling system 3 or the gambling operator based on the risk

information determined by the assessment server 4, such as the likelihood of the first player 2' self-excluding, the first player's overall risk score and/or any other determined risk indicators and/or scores described above. Examples of such changes are described below. The examples described below may be implemented in combination with each other. The changes may be made as a result of instructions sent from assessment server 4 to the operator server 5, or by the operator server 5 implementing the changes independently or automatically in response to receiving the risk information from the assessments server 7.

10 In a first example, the method of Figure 2 may include changing the responsible gaming settings of the first player's account. For example, if the risk information determined by the assessment server 4 indicates that the first player 2' is likely to self-exclude in the near future, or if the player shows other strong signals associated with problem gambling, the operator server 5 may exclude the first player 2' from using the gambling services 7, or
15 from using any services (e.g. websites) or facilities provided by the gambling operator. Alternatively or additionally, the operator server 5 may implement pre-defined limits on the first player 2' in terms, such as deposit limits, session/game-play time limits and/or loss limits, if their risk information indicates them to be likely to self-exclude, or if the player shows other strong signals associated with problem gambling. Or alternatively the
20 operator server 5 may request the first player 2' sets their own limits if they have not already done so, if the risk information determined by the assessment server 4 indicates that the first player 2' is likely to self-exclude in the near future, or if the player shows other strong signals associated with problem gambling. The operator server 5 may also lower or remove previously defined limits if the first player's behaviors are indicated as having
25 moved to a lower risk category by the risk information determined by the assessment server 4.

In a second example, the method of Figure 2 may include changing the first player's 2' experience by altering the amount or type of information they receive comprising
30 marketing information which might encourage them to increase their gambling or to otherwise adopt unsustainable gambling behaviors. In more detail, if the risk information determined by the assessment server 4 indicates that the first player 2' is likely to self-exclude or if the player shows other strong signals associated with problem gambling, the

operator server 3 may reduce the amount of, or alter the type of, marketing information displayed to the first player when they use the services, including the gambling services 7, of the gambling system 3, such as when they use the EGMs 13, when they use the network portal 26, 30 and/or when they receive communications from the gambling operator or the assessments server 7 via email or SMS. For example, if the risk information indicates that the first player 2' is significantly likely to self-exclude in the near future, then the first player 2' may be excluded from receiving any marketing information. Altering of the type of marketing information may be based on the behavioral risk profile of the player in question. For example, a player 2 who is showing behavioral risk indicators such as a high level of bet intensity would be excluded from cross-sell marketing of games 7 provided by the gambling system 3 that are continuous and that allow bets to be placed with short intervals (e.g. casino-style games), as these types of games can exacerbate that particular risk behavior shown by the player 2. Likewise, a player 2 showing decreasing or low risk levels could result in the gambling system 3 initiating more marketing messages to stimulate gambling given the player's risk category is considered low risk.

In a third example, the method of Figure 2 may include changing the first player's 2' experience by altering the amount of gifted or bonus money they receive from the gambling system 3. Such gifted or bonus money would typically be provided to a player 2 by the gambling system 3 in the form of bonuses credit(s). In more detail, if the risk information determined by the assessment server 4 indicates that the first player 2' is likely to self-exclude or if the player shows other strong signals associated with problem gambling, the operator server 5 may change which bonuses are sent to the first player 2' based on their behavioral risk profile. For example a player who has a strong statistical trend of increasing the amount of money wagered over a period time would automatically be excluded from 'deposit bonus' offers from the gambling system 3, as depositing real-money is a behavior that would possibly exacerbate this risk behavior.

For simplicity, step 2.2 is shown in Figure 2 as occurring in sequence before steps 2.3 to 2.6. In this case, the system 1 may be configured such that steps 2.3 onwards of the method of Figure 2 only occur if one or more risk factors are identified.

Alternatively, step 2.2 may occur in parallel to steps 2.3 and 2.4, wherein both step 2.2 and steps 2.3 and 2.4 can be followed by step 2.5. In this respect, the identified behavioral risk indicators of the first player 2' which, as described above, may be used at step 2.3, may comprise behavioral risk indicators identified during a previous execution of the method of Figure 2. Moreover, the first player's 2' question responses and/or their identified response risk indicators which, as described above, may be used at step 2.3, may comprise question responses and/or their identified response risk indicators determined during a previous execution of the method of Figure 2. Furthermore, the peer-based behavioral risk indicators of the first player 2' which, as described above, may be used at step 2.3, may comprise peer-based behavioral risk indicators of the first player 2' determined during a previous execution of the method of Figure 2. Also, the determined behavioral risk score of the first player 2' which, as described above, may be used at step 2.3, may comprise a determined behavioral risk score of the first player 2' determined during a previous execution of the method of Figure 2.

Similarly, steps 2.2, 3.1, 3.2, 2.3, 3.3 and 2.4 of Figure 3 are shown as occurring in sequence. However, alternatively, steps 2.2, 3.1 and 3.2 may occur in parallel to steps 2.3, 3.3 and 2.4, both followed by step 2.5. Moreover, step 2.2 may occur in parallel to steps 3.1 and 3.2. Similarly, step 2.3 may occur in parallel to step 3.3, wherein both steps 2.3 and 3.3 can be followed by step 2.4. Furthermore, steps 2.6 and 2.7 may occur in parallel to step 3.4.

The information 22, 22' relating to a player's behavior may be referred to as player behavior information 22, 22' or information 22, 22' on a player's behavior.

The information 23, 23' on behavior directly related to gambling may be referred to as gambling behavior information 23, 23', information 23, 23' on gambling related behavior or information 23, 23' on gambling behavior.

The other information 24, 24' relating to a player's behavior may be referred to as non-gambling behavior information 24, 24' or information 24, 24' on behavior that's not directly related to gambling.

The player profile 20, 21, 20', 21' stored for any one player 2 may be regarded as comprising the following subsets of data:

- Gambling data, comprising the following subsets of data:
 - Player data, comprising information identifying the player, registration
5 information relating to the player's registration for use of services of the
gambling operator, demographic information such as the gender and date of
birth of the player and information identifying a player marketing segment
to which the player has been determined by the operator as belonging to;
 - Game data, comprising the information relating to game-play by the player
10 on the gambling operator's server 3, such as the game session unique
identifier, the session start time and finish time, the game name and unique
identifier, the amount of real-money wagered during the game, the amount
of bonus money wagered during the game, the amount won/lost, etc;
 - Transactional data, comprising data relating to how the player deposits real
15 money in his/her account that sits on the gambling operator's server 3,
which includes the source of deposits (e.g. credit card, debit card, etc) and
whether any transactions have been declined by the first user's bank; and
 - Limits data, comprising data relating to the responsible gaming limits that
20 have been set by the player in his/her account in the gambling operator's
server 3, such as self-exclusion start/end time dates, deposit limits and
which period this relates to (e.g. daily, weekly, monthly, etc), loss limits, etc;
and
- Non-Gambling Data, comprising information about the player that could be
relevant in the context of behavioral analysis and which does not belong to any of
25 the data subsets of gambling data as described above. Such data could include data
relating to the player's communications with the gambling operator (either
observed by the gambling operator staff in a casino land venue for example, via
telephone, online chat rooms and messaging and email), and also data relating to
the player that is held by third parties and is legally acquirable by the gambling
30 operator e.g. player credit agency scores, social media data relating to the player,
medical records (subject to consent being provided by the user), etc.

Players 2 identified as having a high likelihood of self-excluding, or identified as having a high overall risk score may suffer from one or more forms of problem gambling, such as clinical pathological gambling. The method and apparatus described above may be used to provide therapy for, or to treat, such problem gambling disorders or players before they
5 develop a problem gambling disorder.

The system 1 can perform monitoring behavioral change of a player 2 when the player is known to the system or when the player is anonymous. Anonymous play typically relates to play on physical gaming machines 13, 16 where a player doesn't need to have an account or
10 doesn't use a loyalty card.

Figure 4 illustrates operation of the system 1 of Figure 1 with regard to anonymous play by a player 2. The method of Figure 4 comprises all but steps 2.1 and 3.3 of Figure 3, with the only difference being that instead of these steps being performed in relation to the first
15 player, they are performed in relation to an anonymous player. Moreover, any action initiated at step 2.5 will only be implemented via the gambling service 7 being used by the player. Alternatives and variations described above with reference to the method steps of Figure 3 also apply to these steps as implemented in the method of Figure 4. Initially a discrete gambling session is defined at step 4.1, and this is based on analysing things such
20 as whether the starting balance in the machine 13 is zero, indicating that the previous player 2 has finished or cashed out, and/or the time from the last spin on the machine 13 being greater than 60 seconds for example, indicating a period where the play is not continuous. Alternatively, the discrete gambling session may be defined based on a player 2 inserting cash into an EGM 13 in order to start an unregistered play session. The player
25 starts to play and the system 1 captures data points throughout the play session. Once sufficient data points are obtained, then steps 2.2 to 3.2 are implemented to analyse patterns and behavior change in the session in real time. Where a statistically significant result is triggered, or the behavior is deemed excessive in comparison to the average/norm for the player's category (e.g. 99th percentile for bet intensity), then the actions of steps 2.3
30 to 2.5 are implemented.

The system 1 of Figure 1 has been described above as using self-exclusion as a proxy, or indicator, for a player being at-risk of having or developing a gambling problem. However,

other proxies or indicators may instead or additionally be used. For example, reaching a high score on the PGSI based on an assessment of a player's responses to questions provided at step 2.3 may be used as an indicator that a player is at-risk. For example, in this case, step 2.4 would comprise determining a likelihood that the player would reach a high score on the PGSI in the near future, and the actions of step 2.5 would be configured to change a player's behavior so as to avoid their reaching a high score on the PGSI.

Steps 2.3 and 2.4 may for example be performed using other statistical classification techniques, such as non-parametric analysis, artificial neural network techniques, random forest decision trees, or Bayesian theory, or by use of clustering techniques, such as hierarchical or k-means. The statistical analysis may also involve Wald statistics or LR tests to describe the average effects of each predictor variable to the outcome using confidence intervals. For instance, the model may permit conclusions of the following type: "A determined 31% increase in average bet quantity increases the odds that the player 2 will self-exclude in the future by 21% (with 95% confidence that this average figure lies between 20% and 23%). Moreover, the assessment server 4 may be configured such that the technique or techniques used by the assessment server at steps 2.3 and 2.4 are configurable, for example, by commands from the operator server 5.

The above described functions of the operator server 5 and the assessment server 4 may be performed by a single server.

The network portal 30 provided by the assessment server's 7 may be distinct and separate from, rather than integrated within, the network portal 26 provided by the operator server 5.

The network 27 may for example be the internet. Moreover players' 2 computing devices 8 may access the network 27 wirelessly, for example via a wireless local area network (WLAN) connection.

Information 22, 22' relating to the behavior of a player 2 can comprise a diversity of different types of data points and contexts. For example, a data point may be configurable and may take the form of a single wager or bet, the aggregated wagers or bets in a single

session, or the aggregated wagers or bets in a defined calendar period such as a gambling day, a gambling week or a time-based period such as a five or ten minute period. Analysis of a player's 2 behavioral data may comprise analysis of all of the data points stored for the player 2, or may comprise analysis of certain portions of the data, such as data pertaining to the last 31 days or data pertaining to the last 31 days of gambling activity. Moreover, the portions of the stored data on a player 2 which are used by the assessment server 4 at the various steps of the method of Figures 2, 3 and 4 may be configurable, for example by commands from the operator server 5.

10 In addition, the parameters in the assessment server 4 that are used to determine behavioural risk indicators, and/or which define the various thresholds discussed above, may be configurable. For example, they may be configured based on testing using historical player data stored on the operator server 5 and memory 11 and research evidence relating to disordered gambling, both globally applicable and also relating specifically to the jurisdiction where the play is undertaken. For example, the assessment server 4 can be configured to flag statistically significant behavioral changes at any threshold deemed appropriate. For example, this allows a first gambling operator to set the threshold for flagging behavioral change at a different level to that used by a different second gambling operator. Also, the thresholds for determining a behavioural risk indicator can be configured to take into account the game type. For example, the scoring algorithm may be configurable, in that the parameters flagging behavioral change can be calibrated so that certain behaviors provide a greater contribution to the overall risk scoring to account for different game characteristics. For example, because casino games are continuous games and faster than other types of games (e.g. Poker), in terms of the number of rounds or games that can be played in a period, the assessment server 4 can be configured to lower the thresholds for flagging the specific behavioral indicator of a significant increase in betting intensity (number of bets or wagers placed). Alternatively, for lottery, one might not consider betting intensity as the most important behavioral factor; however changes in betting frequency (how often someone returns to gamble or wager) of lottery ticket purchases by a player 2 might be considered a more relevant risk factor to track, hence the threshold for flagging betting frequency as a behavioural risk indicator may be lowered compared to that for flagging betting intensity. Moreover, with regard to the above described use of absolute values in determining behavioral risk indicators, the absolute

values used may also be configurable. For example, to allow for configuration based on factors such as peer-reviewed research, jurisdiction and game type.

5 The assessment server 4 may also be configured to provide services via the network portal 26, 30 by which individuals associated with the gambling operator, such as staff tasked with managing the gambling operator's responsible gaming services, can adjust and/or configure the operation of the assessment server 4. For example, this may allow gambling operator staff to configure the portions of the stored data on a player 2 which are used by the assessment server 4 at the various steps of the method of Figures 2, 3 and 4.

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The invention has been described above in the context of a risk activity comprising gambling. However, the skilled person will understand that the invention may be applied in the context of other risk activities. For example, the invention may be applied in the context of stock market investment activities. In this case, the above described functions of the operator server 5 might instead be carried out by a server operated by a stockbrokerage and the above described players 2 might instead take the form of investment clients.

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Moreover, the assessment server 4 would be configured to determine a likelihood that an investment client 2 might start to exhibit unsustainable investment behavior. In a further example, the invention may be applied in the context of social gaming, such as casino-style social games, which are gambling-style games, but without the regulated gambling aspects. In this case, the above described functions of the operator server 5 might instead be carried out by a server operated by a social casino game operator and the above described players 2 might instead take the form of social gamers. Moreover, the assessment server 4 would be configured to determine a likelihood that the social game play client 2 might start to exhibit unsustainable playing behavior which could lead to negative financial, personal, and social consequences. In a further example, the invention may be applied in the context of assessing retail banking. In this example, the proxy for defining at-risk behavior may relate to customers who experience financial difficulty, e.g. using the likelihood of a customer defaulting on a loan payment or going over-drawn on their current account.

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Players' 2 computing devices 8 may each access the network portals 26, 30 using an application installed and operating on each of the computing devices 8. Alternatively, the

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computing devices 8 may each comprise one or more applications providing the above described functions of the network portals 26, 30.

5 The messages stored in the message bank 33a, and the logic by which the one or more actions are configured by the assessment server 4, may be configurable by the operator server 5.

The method of Figure 2 is described above as being performed by the assessment server 4. However, the method may alternatively be performed by a player's 2 computing device 8.
10 For example, above described functions of the assessment server 4 in relation to a player 2 may be performed by the computing device 8 of that player 2, and instead of providing the network portal 30, the computing device 8 may simply provide the above described services of the network portal 30 to the player 2 directly via the user interface 9 of the device 8.

15 The system can either perform periodic analysis or real-time analysis. In more detail, the system can analyse behavioral changes of a player 2, and make appropriate interventions, either by analysing the player's 2 behavioral data periodically (e.g. daily) or as and when the player 2 is playing (real-time).

20 The network portal 26 is described above as being configured such that it enables communications with players 2 and allows players 2 to set and adjust parameters of their player accounts stored on the gambling system 3, such as setting self-imposed betting limits or initiating a self-exclusion period. Moreover, it is described above that when a
25 player 2 alters these gambling parameters, this behavior is stored in the player's respective player profile 20, 21 as information 23 on behavior directly related to gambling. The gambling system 3 may be configured to provide the same functionality via one or more of the services 7. For example, the gambling system 3 may be configured such that it allows
30 players 2 to set and adjust, via the EGMs and/or VLTs, parameters of their player accounts stored on the gambling system 3, such as setting self-imposed betting limits or initiating a self-exclusion period. Moreover, when a player 2 alters these gambling parameters via the EGMs and/or VLTs, this behavior is stored in the player's respective player profile 20, 21 as information 23 on behavior directly related to gambling.

The various embodiments described above/herein facilitate a number of improvements.

The system 1 allows gambling operators to identify and protect vulnerable players 2, such as by messaging them so as to educate the players 2 regarding their behavior and so as to
5 both prompt and enable them to make more informed decisions about how they should be managing their game play. The system 1 can be an invaluable tool for helping prevent those gamblers showing the early signs of developing problem or disordered gambling behaviors from reaching the point at which they start causing harm. Furthermore, significantly, the apparatus of system 1 enables these advantages to be realised in real-
10 time, as a player's 2 gambling behavior is occurring.

Many modifications and variations of the embodiments of the invention described herein are possible within the scope of the claims hereinafter. Furthermore the particular naming of the components, capitalization of terms, the attributes, data structures, or any other
15 programming or structural aspect is not mandatory or significant, and the mechanisms that implement the invention or its features may have different names, formats, or protocols. Further, the processes described herein may be implemented via a combination of hardware and software, or entirely in hardware or software. Also, the particular division of functionality between the various system components described herein is merely
20 exemplary, and not mandatory; functions performed by a single system component may instead be performed by multiple components, and functions performed by multiple components may instead be performed by a single component.

Some portions of the above description present the features of the present invention in
25 terms of symbolic representations of operations on information. These representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. These operations, while described functionally or logically, are understood to be implemented by computer programs. Furthermore, the reference to these operations in terms of modules or software
30 applications should not be considered to imply a structural limitation and references to functional names is by way of illustration and does not infer a loss of generality.

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Unless specifically stated otherwise as apparent from the description above, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "receiving" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that
5 manipulates and transforms data represented as physical (electronic) quantities within the computer system memories or registers or other such information storage, transmission or display devices.

Certain aspects of the present invention include process steps and instructions described herein in the form of a software application. It should be understood that the process steps,
10 instructions, of the present invention as described and claimed, are executed by computer hardware operating under program control, and not mental steps performed by a human. Similarly, all of the types of data described and claimed are stored in a computer readable storage medium operated by a computer system, and are not simply disembodied abstract ideas.

15

CLAIMS:

1. A method provided by a computer and comprising:

receiving, periodically, in real time, by a processing device, behavior information relating to a first user's behavior;

analyzing, periodically, in real time, by the processing device, the behavior information using a plurality of statistical tests, to identify one or more behavioral risk indicators, wherein each identified risk indicator is indicative of a statistically significant behavioral change exceeding a corresponding threshold;

in response to identifying the one or more behavioral risk indicators, using statistical classification techniques including at least one Artificial Intelligence (AI) technique or using clustering techniques, to determine one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users;

based on the one or more determined similarities, determine a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and

in response to determining a high likelihood of the first user being at risk, initiating one or more actions configured to cause the first user to change their behavior in risk activity.

2. The method of claim **1**, wherein using the statistical classification techniques to determine one or more similarities comprises determining similarities between the identified one or more behavioral risk indicators and behavioral risk indicators associated with the one or more second users.

3. The method of claim **1** or **2**, comprising receiving non-behavioral information relating to the first user and determining, by the processing device, one or more similarities between the first user's non-behavioral information and stored non-

behavioral information relating the one or more second users, wherein using the statistical classification techniques to determine the likelihood is also based on the determined one or more similarities between the first user's non-behavioral information and non-behavioral information relating the one or more second users.

4. The method of any one of claims **1** to **3**, wherein analyzing the behavior information comprises identifying a group of the one or more second users with similar behavior to the first user, and identifying behavioral risk indicators comprising one or more statistically significant differences in the behavior of the first user compared to the average behavior of the group of second users.

5. The method of any one of claims **1** to **4**, comprising enabling provision to the first user of one or more questions and receiving answers from the first user and using the statistical classification techniques to determine the one or more similarities between the first user's question responses and stored question responses of one or more second users.

6. The method of claim **5**, wherein the enabling provision to the first user of the one or more questions is in response to identifying the one or more risk indicators.

7. The method of any one of claims **1** to **4**, wherein initiating one or more actions comprises enabling the first user to be provided with one or more messages configured to encourage the first user to change their behavior in the risk activity.

8. The method of claim **7**, wherein enabling the first user to be provided with one or more messages comprises displaying the one or more messages on a display for viewing by the user.

9. The method of claim **7**, wherein enabling the first user to be provided with one or more messages occurs in response to the determined likelihood of the first user exhibiting the behavior in the risk activity being above a threshold likelihood.

10. The method of claim 7, wherein the one or more messages are configured based on the determined likelihood of the first user exhibiting the behavior in the risk activity and/or the one or more behavioral risk indicators.

11. The method of any one of claims 1 to 10, wherein the information relating to behavior of the first user and the information relating to behavior of the one or more second users comprise information on behavior related to gambling, wherein the statistically significant behavioral change of each of the one or more risk indicators is considered to be associated with problem gambling, and wherein the risk activity comprises gambling.

12. The method of claim 11, wherein the behavior exhibited by each of the one or more second users comprises self-exclusion or reaching a score on a self-assessment test which indicates that they have a gambling problem.

13. The method of claim 11 or 12, comprising receiving at least part of the information on the first user's behavior from a gambling operator used by the first user and sending the information on the determined likely future gambling behavior of the first user to the gambling operator.

14. The method of any one of claims 1 to 13, comprising the first user, in response to the one or more actions, changing their behavior in the risk activity to differ from the behavior in the risk activity which was exhibited by the one or more second users.

15. An apparatus comprising a processor and a memory comprising computer program code, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus at least to perform:

receiving, periodically, in real time, behavior information relating to a first user's behavior;

analyzing, periodically, in real time, by the processor, the behavior information, using a plurality of statistical tests, to identify one or more behavioral risk indicators, wherein each identified risk indicator is indicative of a statistically significant behavioral

change exceeding a corresponding threshold;

in response to identifying the one or more behavioral risk indicators, using statistical classification techniques including at least one Artificial Intelligence (AI) technique or using clustering techniques to:

determine one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; and

based on the one or more determined similarities, determine a likelihood of the first user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and

in response to determining a high likelihood of the first user being at risk, initiating one or more actions configured to encourage the first user to change their behavior in the risk activity.

16. The apparatus of claim **15**, wherein using the statistical classification techniques to determine one or more similarities comprises determining similarities between the identified one or more behavioral risk indicators and behavioral risk indicators associated with the one or more second users.

17. The apparatus of claim **15** or **16**, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus to perform receiving non-behavioral information relating to the first user, and using the statistical classification techniques to determine one or more similarities between the first user's non-behavioral information and stored non-behavioral information relating the one or more second users, and wherein determining the likelihood of the first user exhibiting the behavior in the risk activity which was exhibited by the one or more second users is also based on the determined one or more similarities between the first user's non-behavioral information and non-behavioral information relating the one or more second users.

18. The apparatus of any one of claims **15** to **17**, wherein analyzing the behavior information comprises identifying a group of the one or more second users with similar behavior to the first user and identifying behavioral risk indicators comprising one or more statistically significant differences in the behavior of the first user compared to the average behavior of the group of second users.

19. The apparatus of claim **15**, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus to perform enabling provision to the first user of one or more questions and receiving answers from the first user, and determining one or more similarities between the first user's question responses and stored question responses of one or more second users.

20. The apparatus of claim **19**, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus to perform the enabling provision to the first user of the one or more questions in response to identifying the one or more risk indicators.

21. The apparatus of claim **15** or **16**, wherein initiating one or more actions comprises enabling the first user to be provided with one or more messages configured to cause the first user to change their behavior in the risk activity.

22. The apparatus of claim **21**, wherein enabling the first user to be provided with one or more messages comprises displaying the one or more messages on a display for viewing by the user.

23. The apparatus of claim **21**, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus to perform the enabling the first user to be provided with one or more messages in response to the determined likelihood of the first user exhibiting the behavior in the risk activity being above a threshold likelihood.

24. The apparatus of claim **21**, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus to configure the one or more messages based on the determined likelihood of the first user exhibiting the behavior in the risk activity and/or the one or more behavioral risk indicators.

25. The apparatus of claim **15** or **16**, wherein the information relating to behavior of the first user and the information relating to behavior of the one or more second users comprise information on behavior related to gambling, wherein the one or more risk indicators each comprise a statistically significant behavioral change considered to be associated with problem gambling, and wherein the risk activity comprises gambling.

26. The apparatus of claim **25**, wherein the behavior exhibited by each of the one or more second users comprises self-exclusion or reaching a score on a self-assessment test which indicates that they have a gambling problem.

27. The apparatus of claim **25** or **26**, wherein the memory and the computer program code are configured to, with the processor, cause the apparatus to perform receiving at least part of the information on the first user's behavior from a gambling operator used by the first user and

sending the information on the determined likely future gambling behavior of the first user to the gambling operator.

28. A method provided by a computer and comprising:

receiving, periodically, in real time, by a processing device, behavior information relating to a first user's behavior of a first anonymous user;

analyzing, periodically, in real time, by a processing device, the behavior information using a plurality of statistical tests, to identify one or more first behavioral risk indicators, wherein each identified risk indicator is indicative of a statistically significant change in behavior of the first anonymous user exceeding a corresponding threshold;

in response to identifying the one or more behavioral risk indicators, using statistical classification techniques including at least one (Artificial Intelligence) AI technique or using clustering techniques to:

determine one or more similarities between the first user's behavior information and stored information relating to the behavior of one or more second users; and

based on the one or more determined similarities, determine a likelihood of the first anonymous user exhibiting a behavior in a risk activity which was exhibited by the one or more second users; and

in response to determining a high likelihood of the first user being at risk, initiating one or more actions configured to cause the first anonymous user to change their behavior in the risk activity.

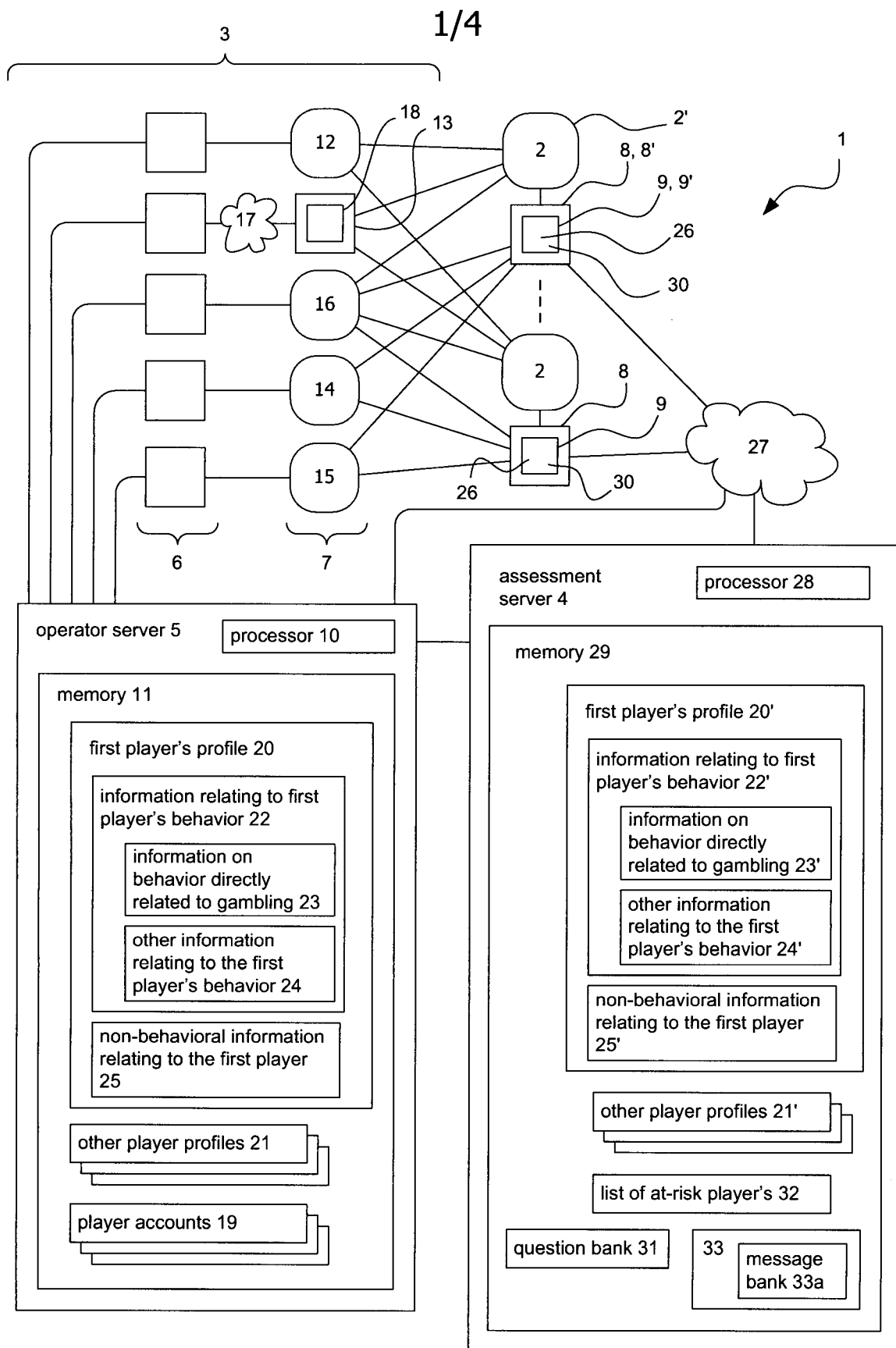


Figure 1

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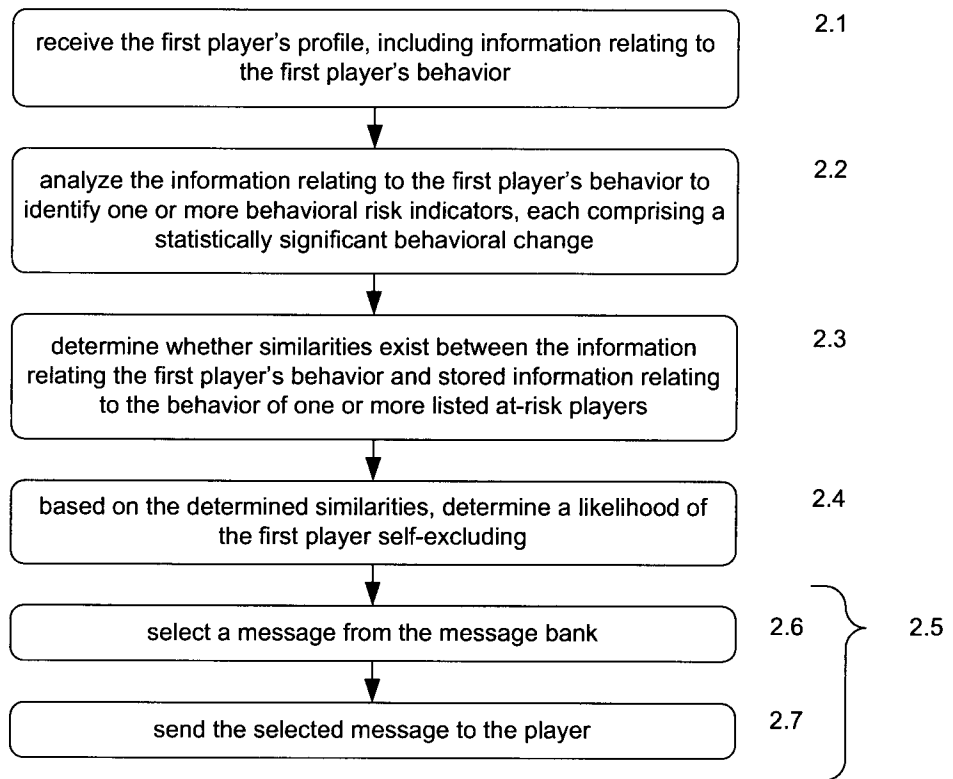


Figure 2

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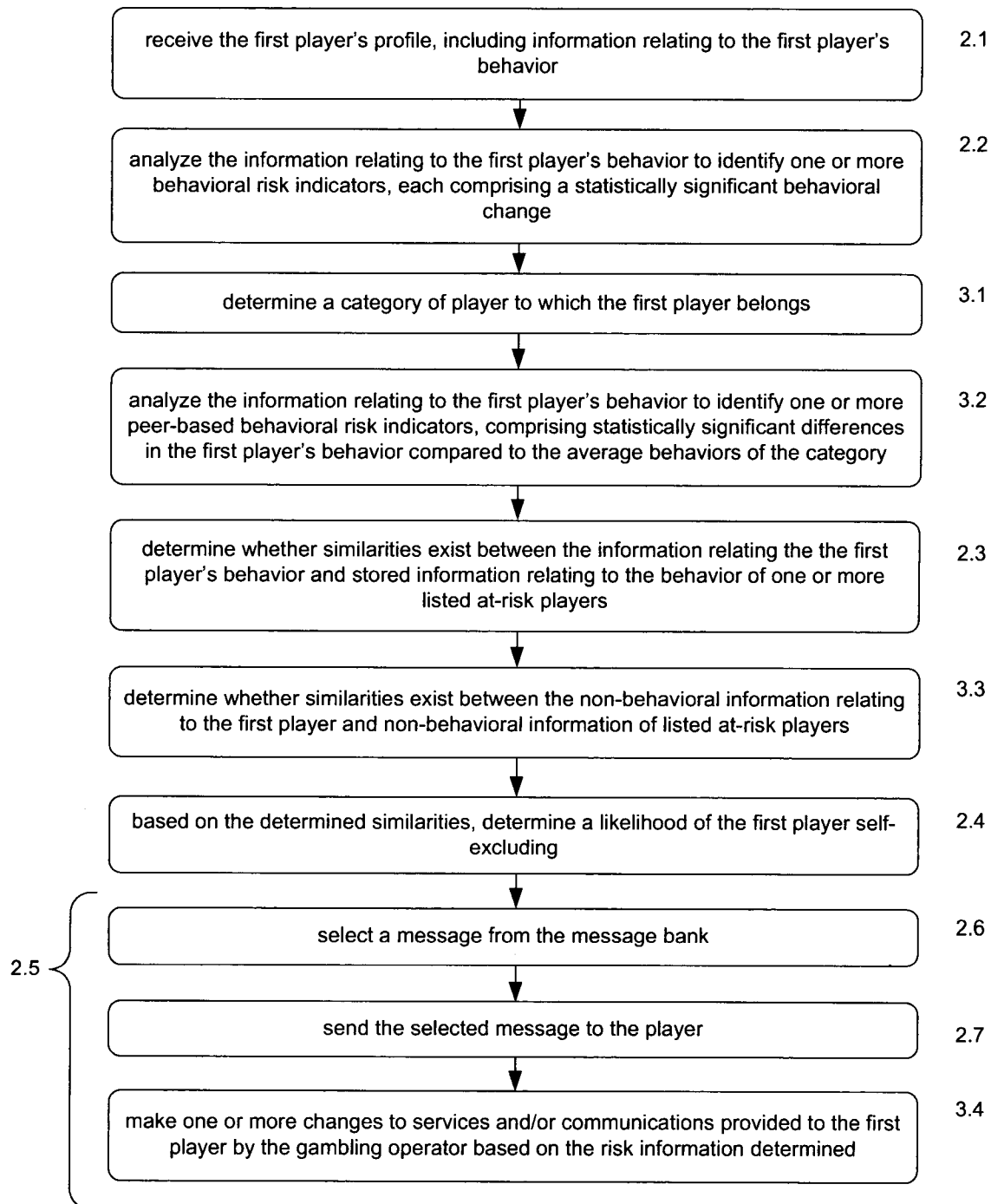


Figure 3

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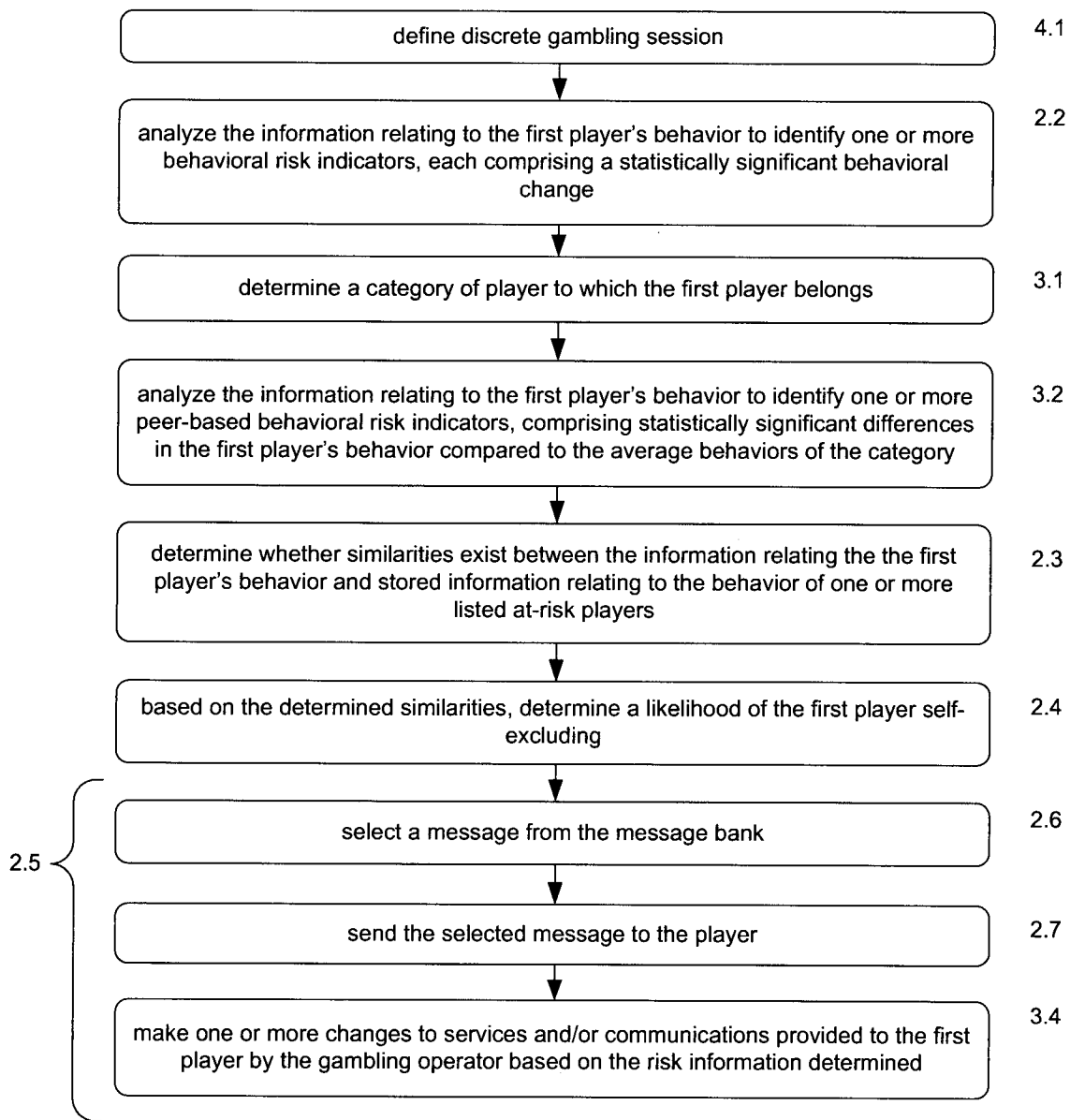


Figure 4

