

CLAIMS:

1. A method of emulating human-like responses comprising:
 - storing a library comprising one or more different subject matter data structures, each data structure comprising ~~a set of stimuli~~ a plurality of output instructions related to
 - 5 the subject matter of the data structure ~~and one or more output instructions associated with each stimulus~~, each output instruction for producing a human-like response to an associated stimulus;
 - receiving a stimulus;
 - looking up output instructions in each data structure that are associated with the
 - 10 received stimulus;
 - outputting one or more responses to the received stimulus according to ~~the~~ found output instructions;
 - wherein the data structures are arranged such that the output instructions are grouped hierarchically according to their respective associated stimulus.
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2. A method as claimed in claim 1, wherein the method comprises ~~receiving a plurality of stimuli~~, looking up output instructions in each data structure ~~that are~~ associated with the received ~~stimuli~~ stimulus, combining the output instructions found, and outputting the combined responses to the received ~~stimuli~~ stimulus.
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3. A method as claimed in claim 1 or 2, wherein the output instructions produce the response in the form of one or more of the following: language, an animated graphical display, voice characteristics, and/or control signals.
- 25 4. A method as claimed in any one of the preceding claims, wherein when no output instructions are found to be associated with the input stimulus, the new stimulus is recorded and a taught response is input in the data structure, the response being taught by a human by providing instructions for producing the response.
- 30 45. A method as claimed in claim 3, wherein where the responses are language, they are in the form of one or more sentences constructed of one or more sentence segments, wherein each sentence segment conveys a coherent meaningful piece of information.

56. A method as claimed in claim 45, wherein sentence segments are several words long, each sentence segment is constructed of one or more words that have a relevant meaning in response to the associated stimulus.

5 67. A method as claimed in claim 56, wherein the sentence segments are human authored and are of the same type of response that a human would make if the human received the input stimulus.

78. A method as claimed in any one of the claims 45 to 67, wherein sentence segments
10 are associated with a sentence position category, which indicates where within a complete sentence the sentence segment is permitted to be located.

89. A method as claimed in claim 78, wherein the sentence position categories are beginning, middle and end.

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910. A method as claimed in claim 78 or 89, wherein a sentence segment may be associated with more than one sentence position category.

1011. A method as claimed in one of the claims 78 to 910, wherein sentences are
20 constructed from the associated sentence segments according to their permitted location with each sentence according to the associated sentence position category/categories.

1112. A method as claimed in one of claims 45 to 1011, wherein each output instruction is associated with one sentence segment.

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1213. A method as claimed in one of claims 45 to 1112, wherein each output instruction is associated with a scripted sentence.

1314. A method as claimed in one of claims 1 to 1213, wherein each output instruction is
30 associated with a priority rating, the output device delivers the output in an order according to the priority rating.

~~14~~15. A method as claimed in one of the claims 1 to ~~13~~14, wherein each data structure is arranged in a plurality of levels, where alternative contextually related stimuli are grouped in the same level.

5 ~~15~~16. A method as claimed in claim ~~14~~15, wherein matching is initially limited to looking within a level of the data structure for a stimulus matching one of the received stimuli and will only search outside the level if a match is not found.

10 ~~16~~17. A method as claimed in claim ~~15~~16, wherein the previous level within which a match was found is recorded which initiates the next search for a match within the same level.

15 ~~17~~18. A method as claimed in claim ~~15~~16, wherein in the previous level within which a match was found is recorded which initiates the next search for a match within the next level down relative to the previous level.

20 ~~18~~19. A method as claimed in claim ~~15~~16, wherein in the event a match is not found within the current level, searching will proceed to parallel levels and then up through the levels of the data structure.

25 ~~19~~20. A method as claimed in claim ~~15~~16, wherein the levels for each data structure may be hierarchically arranged.

30 ~~20~~21. A method as claimed in claim ~~19~~20, wherein searching for matches will progress through the hierarchy is a match is not found.

35 ~~21~~22. A method as claimed in one of claims ~~15~~16 to ~~20~~21, wherein a history of matches is recorded, such that in the event that a match is not found in a level, and there is a choice of which level to search next, the history of matches is used to choose which level to search next.

40 ~~22~~23. A method as claimed in one of claims 1 to ~~21~~22, wherein stimuli is in the form of human generated stimuli, environmental stimuli, or machine generated stimuli.

~~23~~24. A method as claimed in one of claims 1 to ~~21~~22, wherein the human generated stimuli is speech.

5 ~~24~~25. A method as claimed in one of claims ~~45~~ to ~~12~~13, wherein alternative sentence segments having different form but having the same meaning are stored in the data structure and when a match occurs one of the alternatives is chosen in a random manner for output.

10 ~~25. — A method as claimed in one of claims 1 to 24, wherein when a match to the input stimuli is not found in the data structure the new stimulus is recorded and a taught response in the data structure.~~

~~26. — A method as claimed in claim 25, wherein the response is taught by a human by~~
15 ~~providing instructions for producing the response.~~

~~27~~26. A method as claimed in one of claims 1 to ~~26~~25, wherein the form of the data structure permits alternative stimuli having the same meaning to be commonly associated with a set of response instructions.

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~~28. — A method as claimed in one of claims 25 to 27, wherein when the new stimulus is added to the data structure a level within the hierarchy is allocated and recorded.~~

27. A method as claimed in any one of the preceding claims when dependent on claim
25 4, wherein when the new stimulus is added to the data structure a level within the hierarchy is allocated and recorded.

~~29~~28. A method as claimed in one of the claims 1 to ~~28~~27, wherein input stimuli are pre-processed prior to look-up of a match.

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~~30~~29. A method as claimed in one of claims 1 to ~~29~~28, wherein input stimuli are post-processed after the look-up of a match.

~~31~~30. A method as claimed in claim ~~29~~28 or ~~30~~29, wherein the processing involves applying mathematical and/or logical operations to the input stimuli.

~~32~~31. A method as claimed in one of claims 1 to ~~31~~30, wherein matched stimuli are
5 processed by applying mathematical and/or logical operations to the corresponding response instructions.

~~33~~32. A method as claimed in one of the claims 1 to ~~32~~31, wherein the library comprises selected data structures such that the human-like responses produced reflect a personality,
10 in that the human-like responses are those which the personality would make.

~~34~~33. A method as claimed in one of the claims 1 to ~~33~~32, wherein the library comprises selected response instructions that are instructional to a human observer.

15 ~~35~~34. A method as claimed in one of claims 1 to ~~34~~33, wherein the library comprises selected response instructions that are constructed to document events reflected by the inputs stimuli.

~~36~~35. A method as claimed in one of claims 1 to ~~35~~34, whereby the library comprises
20 selected response instructions such that the human-like responses encourage a discourse with a user.

~~37~~36. A method as claimed in one of claims 1 to ~~36~~35, wherein the human-like response
25 is self contained meaningful in its own right.

~~38~~37. A human-like response emulator comprising:
a library stored on a storage device, the library comprising one or more different subject matter data structures, each data structure comprising a set of stimuli related to the subject matter of the data structure and one or more output instructions associated with
30 each of the stimuli, each output instruction for producing human-like response to the associated stimulus;
an input device for receiving stimuli;

a look-up device for looking up output instructions in each data structure that are associated with each received stimulus;

an output device for delivering one or more responses to the received stimuli according to the output instructions found by the look-up device.

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~~39. — A computer implemented method of construction of human-like sentences in response to an input comprising:~~

~~—— providing a plurality of sentence segments, each sentence segment having sentence position information associated therewith and being a self-contained and meaningful group of words;~~

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~~—— selecting a plurality of the sentence segments according to an input;~~

~~—— assembling the sentence segments into a sentence according to the sentence position information associated with each of the selected sentence segments; and~~

~~—— outputting the assembled sentence.~~

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~~40. — A method as claimed in claim 39, wherein the sentence is output as text or speech.~~

~~41. — A method as claimed in claim 39 or 40, wherein the sentence position information designates the sentence segment as being at one of: the beginning, middle or end of the sentence.~~

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~~42. — A method as claimed in one of claims 39 to 41, responses are step by step human devised instructions to a human for reacting to a system event input.~~

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~~43. — A method of searching for a hierarchically stored human-like response information associated with stimuli information such that similar stimuli are associated together in the same hierarchical level and different stimuli are associated together in different hierarchical levels, comprising:~~

~~—— recording a designation of the previous stimuli;~~

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~~—— searching for a matching response to an input stimuli within the level of the hierarchy with the same response as the previous stimuli; and~~

~~—— in the event that a matching response is not found searching for a matching input stimuli elsewhere in the hierarchy.~~

~~44. — A method as claimed in claim 43, wherein the search is then conducted sideways within the hierarchy, wherein in the event that a match is not found the search is conducted sequentially upward through the hierarchy.~~

5 ~~45. — A method of computerized speech recognition comprising:~~
 ~~—— providing a hierarchically stored set of expected text inputs;~~
 ~~—— receiving speech input;~~
 ~~—— searching for an expected text input that matches the speech input within a level of~~
 ~~the hierarchy that is the same as previous matched input; and~~
10 ~~—— in the event that a matching text input is not found searching for a matching text~~
 ~~input elsewhere in the hierarchy.~~

~~46. — A method as claimed in claim 45, wherein similar expected text inputs are associated together in the same hierarchical level.~~

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~~47. — A method as claimed in claim 46, wherein the search is then conducted sideways within the hierarchy, wherein in the event that a match is not found the search is conducted sequentially upward through the hierarchy.~~

20 ~~48. — An apparatus for performing one or more of the above methods comprising a means for performing each of the steps of the respective methods as claimed in one of claims 1 to 37 and 39 to 47.~~

~~49. — A computer program comprising instructions for causing a computing device to~~
25 ~~perform one or more of the above methods as claimed in one of the claims 1 to 37 and 39 to 47.~~

~~50. — A computer readable storage medium comprising a computer program as claim in claim 49.~~

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38. An apparatus for emulating human-like responses comprising a processor configured to:

store in a library one or more different subject matter data structures, each data structure comprising a set of stimuli related to the subject matter of the data structure and one or more output instructions associated with each stimulus, each output instruction for producing a human-like response to the associated stimulus;

5 receive a stimulus;

look up output instructions in each data structure that are associated with the received stimulus;

output one or more responses to the received stimulus according to found output instructions.

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39. An apparatus for construction of human-like sentences in response to an input comprising a processor configured to:

store a plurality of sentence segments, each sentence segment having sentence position information associated therewith and being a self contained and meaningful group of words;

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select a plurality of the sentence segments according to an input;

assemble the sentence segments into a sentence according to the sentence position information associated with each of the selected sentence segments; and

output the assembled sentence.

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40. An apparatus for searching for hierarchically stored human-like response information associated with stimuli information such that similar stimuli are associated together in the same hierarchical level and different stimuli are associated together in deferent hierarchical levels, comprising a processor configured to:

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record a designation of the previous stimuli;

search for a matching response to an input stimuli within the level of the hierarchy with the same response as the previous stimuli; and

search for a matching input stimuli elsewhere in the hierarchy when a matching response is not found.

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41. An apparatus for recognising speech comprising a processor configured to:

hierarchically store a set of expected text inputs;

receive speech input;

search for an expected text input that matches the speech input within a level of the hierarchy that is the same as a previous matched input; and

5 search for a matching text input elsewhere in the hierarchy when a matching text input is not found.

42. An apparatus for emulating human-like responses comprising:

10 means for storing a library comprising one or more different subject matter data structures, each data structure comprising a set of stimuli related to the subject matter of the data structure and one or more output instructions associated with each stimulus, each output instruction for producing a human-like response to the associated stimulus;

means for receiving a stimulus;

means for looking up output instructions in each data structure that are associated with the received stimulus;

15 means for outputting one or more responses to the received stimulus according to found output instructions.

43. An apparatus for construction of human-like sentences in response to an input comprising:

20 means for providing a plurality of sentence segments, each sentence segment having sentence position information associated therewith and being a self contained and meaningful group of words;

means for selecting a plurality of the sentence segments according to an input;

25 means for assembling the sentence segments into a sentence according to the sentence position information associated with each of the selected sentence segments; and
means for outputting the assembled sentence.

44. An apparatus for searching for a hierarchically stored human-like response information associated with stimuli information such that similar stimuli are associated together in the same hierarchical level and different stimuli are associated together in
30 deferent hierarchical levels, comprising:

means for recording a designation of the previous stimuli;

means for searching for a matching response to an input stimuli within the level of the hierarchy with the same response as the previous stimuli; and

means for searching for a matching input stimuli elsewhere in the hierarchy when a matching response is not found.

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45. An apparatus for recognizing speech comprising:

means for providing a hierarchically stored set of expected text inputs;

means for receiving speech input;

10 means for searching for an expected text input that matches the speech input within a level of the hierarchy that is the same as a previous matched input; and

means for searching for a matching text input elsewhere in the hierarchy when a matching text input is not found.

15 46. A computer program embodied in a computer readable medium comprising instructions, which when executed control a computer to:

store a library comprising one or more different subject matter data structures, each data structure comprising a set of stimuli related to the subject matter of the data structure and one or more output instructions associated with each stimulus, each output instruction for producing a human-like response to the associated stimulus;

20 receive a stimulus;

look up output instructions in each data structure that are associated with the received stimulus;

output one or more responses to the received stimulus according to found output instructions.

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47. A computer program embodied in a computer readable medium comprising instructions, which when executed control a computer to:

30 store a plurality of sentence segments, each sentence segment having sentence position information associated therewith and being a self contained and meaningful group of words;

select a plurality of the sentence segments according to an input;

assemble the sentence segments into a sentence according to the sentence position information associated with each of the selected sentence segments; and

output the assembled sentence.

48. A computer program embodied in a computer readable medium comprising instructions for searching for a hierarchically stored human-like response information associated with stimuli information such that similar stimuli are associated together in the same hierarchical level and different stimuli are associated together in deferent hierarchical levels, which when executed control a computer to:

record a designation of the previous stimuli;

search for a matching response to an input stimuli within the level of the hierarchy with the same response as the previous stimuli; and

search for a matching input stimuli elsewhere in the hierarchy when a matching response is not found.

49. A computer program embodied in a computer readable medium comprising instructions, which when executed control a computer to:

receive speech input;

search for an unexpected text input that matches the speech input within a level of the hierarchy that is the same as a previous matched input, wherein the hierarchically has a stored set of expected text inputs; and

search for a matching text input elsewhere in the hierarchy when a matching text input is not found.

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