target, the pseudo-orally-ingested products having different physical properties; and

the movement analysis unit is configured to determine free surfaces of the plurality of pseudo-orally-ingested products and boundaries between the plurality of pseudo-orally-ingested products so as to analyze an interlocking behavior of the plurality of pseudo-orally-ingested products.

7. The swallowing simulation apparatus according to any one of claim 1 to claim 6, further comprising

an evaluation/diagnosis unit configured to evaluate or diagnose easiness of eating and/or easiness of drinking of the orally-ingested product based on the behavior of the pseudo-orally-ingested product during swallowed on the movement screen, wherein

the movement screen is a virtual movement screen formed in a virtual space by the swallowing simulation apparatus to simulatively display the analysis result of the movement of each of the head-and-neck organs and the behavior of the pseudo-orally-ingested product during swallowed that are analyzed by the movement analysis unit, and

the evaluation/diagnosis unit is configured to make evaluation or diagnosis based on whether or not a behavior of the pseudo-orally-ingested product in the virtual movement screen satisfies a predetermined condition.

8. The swallowing simulation apparatus according to claim 1 or claim 7, further comprising:

an evaluation/diagnosis-result recording unit configured to record an evaluation result or a diagnosis result related to easiness of eating and/or easiness of drinking of the orally-ingested product based on the analysis result of the behavior of the pseudo-orally-ingested product during swallowed; and

a physical property determiner configured to determine a physical property of the orally-ingested product regarded as appropriate based on the evaluation or diagnosis result recorded in the evaluation/diagnosis-result recording unit.

~~9. A dynamic three dimensional model of a head and neck including head and neck organs, comprising:~~

~~a model of a tongue as one of head-and-neck organs, the model of the tongue having a structure divided into *n* pieces of sector portions in a near far direction, wherein *n* is an integer equal to or more than 2, while a mental region of a mandible as~~

~~an origin of a genioglossus is set to a pivot of sector;~~

~~wherein each of the sector portions is configured to vibrate in cooperation with one another while having a predetermined phase difference in a radial direction so as to perform a traveling wave movement by movements of organs to transport the pseudo-orally ingested product toward a far-side direction.~~

~~10. The dynamic three-dimensional model of the head and neck according to claim 9,~~

~~wherein the model of the tongue has a structure where a dome shape portion of each of the sector portions overlaps with a dome shape portion of another such that a gap is not formed between the sector portions when each of the sector portions vibrates, the dome shape portion being for forming a surface of the tongue, the model of the tongue further has a structure where a tongue surface portion that has both right and left sides extending in the radial direction and has a depression in a central portion between the right and left sides is overlapped with each of the sector portions, and each of the sector portions vibrates in a circumferential direction in the depression of the tongue surface portion in a static state;~~

~~wherein the model of the tongue is configured to be set such that the sector portions rotate by a predetermined angle toward a far side in a circumferential direction during swallowing and then the pseudo-orally ingested product is pushed toward the far side by the sector portion at a farthest side of the tongue;~~

~~wherein the dynamic three-dimensional model of the head and neck has a structure where the head and neck includes a tongue, a palate, a pharynx, a larynx portion, a trachea and a gullet, the larynx portion is divided into an epiglottis and a larynx, an esophageal entrance of the gullet is configured to be closed before swallowing is started, and the esophageal entrance is configured to extend and the pharynx is configured to contract during swallowing; and~~

~~wherein the dynamic three-dimensional model of the head and neck is configured to be set such that the larynx is configured to be moved in a direction to the mental region of the mandible to open the esophageal entrance, the pharynx is configured to contract, and then the epiglottis is configured to be rotated by a predetermined angle toward the far side so as to close an esophageal entrance during swallowing.~~

~~11~~9. A swallowing simulation method, comprising:

a head-and-neck modeling step of forming a dynamic three-dimensional model

of head-and-neck that includes head-and-neck organs;

an organ-movement setting step of setting a movement of each of the head-and-neck organs in the dynamic three-dimensional model of the head-and-neck;

an orally-ingested-product physical-property setting step of setting an orally-ingested product as an analysis target and a physical property of the orally-ingested product;

an input step of inputting a pseudo-orally-ingested product formed by modeling the orally-ingested product to an oral cavity;

a movement analyzing step of analyzing the movement of each of the head-and-neck organs in the dynamic three-dimensional model of the head-and-neck and a behavior of the pseudo-orally-ingested product during swallowed using a particle method; and

a display step of displaying an analysis result of the movement of each of the head-and-neck organs and the behavior of the pseudo-orally-ingested product during swallowed that are analyzed in a three-dimensional space in the movement analyzing step, on a movement screen.

~~12~~10. The swallowing simulation method according to claim ~~11~~9, further comprising:

an evaluation step of evaluating easiness of eating and/or easiness of drinking of the orally-ingested product based on the analysis result of the behavior of the pseudo-orally-ingested product during swallowed; and

a physical property determination step of determining a physical property of the orally-ingested product regarded as appropriate based on an evaluation result evaluated in the evaluation step.

~~13~~11. A program readable by a computer, wherein

the program is configured to make the computer execute the swallowing simulation method according to claim ~~11~~9 or claim ~~12~~10.

~~14~~12. An orally-ingested-product development assistance apparatus, comprising:

the swallowing simulation apparatus according to claim 8;

an orally-ingested-product prototype result recording unit configured to record a result of an experimental production performed under an appropriately-set production condition to have the physical property determined as appropriate by the physical property determiner; and

a production condition determiner configured to determine a production

condition that sets a physical property of the orally-ingested product to the physical property determined as appropriate by the physical property determiner based on a prototype result recorded in the orally-ingested-product prototype result recording unit.

~~15~~13. The orally-ingested-product development assistance apparatus according to claim ~~14~~12, further comprising

an evaluation/diagnosis unit configured to evaluate or diagnose easiness of eating and/or easiness of drinking of the orally-ingested product based on the behavior of the pseudo-orally-ingested product during swallowed, on the movement screen, wherein

the movement screen is a virtual movement screen formed in a virtual space by the swallowing simulation apparatus to simulatively display the analysis result of the movement of each of the head-and-neck organs and the behavior of the pseudo-orally-ingested product during swallowed that are analyzed by the movement analysis unit, and

the evaluation/diagnosis unit is configured to make evaluation or diagnosis based on whether or not a behavior of the pseudo-orally-ingested product in the virtual movement screen satisfies a predetermined condition.

~~16~~14. An orally-ingested-product development method, comprising

the swallowing simulation method according to claim ~~12~~10, wherein

the orally-ingested-product physical-property setting step includes a step of changing the physical property of the orally-ingested product to set, and a step of repeatedly performing a subsequent process up to the physical property determination step, or a step of changing the physical property of the orally-ingested product to set, a step of repeatedly performing a subsequent process up to the evaluation step, and then collectively performing the physical property determination step,

further comprising:

an orally-ingested-product prototype production step of performing an experimental production under an appropriately-set production condition to have the physical property determined as appropriate in the physical property determination step; and

a production condition determination step of determining a production condition that gives a physical property of the orally-ingested product to the physical property determined as appropriate in the physical property determination step based on the result in the orally-ingested-product prototype production step.

~~17~~15. The orally-ingested-product development method according to claim ~~16~~14, wherein

the movement screen is a virtual movement screen formed at a virtual space by a swallowing simulation apparatus to simulatively display an analysis result of a movement of each of the head-and-neck organs and a behavior of the pseudo-orally-ingested product during swallowed, the analysis result being analyzed in the movement analysis step,

the display step is a virtual display step to simulatively display the analysis result on the virtual movement screen, and

the evaluation/diagnosis step is configured to evaluate whether the behavior of the pseudo-orally-ingested product on the virtual movement screen simulatively displayed in the virtual display step meets a predetermined condition or not.

~~18~~16. An orally-ingested-product production method, comprising

a step of producing the orally-ingested product using a production condition determined in the production condition determination step of the orally-ingested-product development method according to claim ~~16~~-14 or claim ~~17~~15.

~~19~~17. A dietary education assistance apparatus, comprising:

the swallowing simulation apparatus according to claim 1 or claim 7;

an evaluation/diagnosis-result recording unit configured to record an evaluation result or a diagnosis result of easiness of eating and easiness of drinking of the orally-ingested product based on the analysis result of the behavior of the pseudo-orally-ingested product during swallowed; and

a teaching unit configured to explain the behavior of the pseudo-orally-ingested product during swallowed displayed on the movement screen by the display unit associating with the evaluation result or the diagnosis result of the orally-ingested product recorded in the evaluation/diagnosis-result recording unit.

~~20~~18. A dietary education method, comprising:

the swallowing simulation method according to claim ~~11~~9;

an evaluation step of evaluating easiness of eating and/or easiness of drinking of the orally-ingested product based on the analysis result of the behavior of the pseudo-orally-ingested product during swallowed; and

a teaching step of explaining the behavior of the pseudo-orally-ingested product

during swallowed displayed on the movement screen in the display step associating with the evaluation result of the orally-ingested product evaluated in the evaluation step.

~~21~~19. The swallowing simulation apparatus according to any one of claim 1 to claim 8, further comprising

an organ movement determiner configured to determine an organ movement parameter fitting to a behavior or a symptom of an organ of a diagnosed person based on the analysis result analyzed in the movement analysis unit in the organ movement parameters set in the organ movement setting unit.

~~22~~20. A diagnosis assistance apparatus; comprising

the swallowing simulation apparatus according to claim ~~21~~19.

~~23~~21. A non-transitory computer readable medium containing program instructions for making a computer to execute the swallowing simulation method according to claim ~~11~~9.