А.	A.1. Purpose	Organizational behavior in the hierarchy agent-based
Overview		model is designed and developed to study process of the
		formation of teams taking into account the mutual
		(generally speaking - asymmetrical) perception of the
		Head and subordinates and changes in the group
		nerformance of the teams
		Group performance depends on the individual
		performance of team members and the relative position
		of group members and their Heads in space (World of
		model is space of perception). The location in space
		changes in accordance with the individual strategies of
		the behavior of agents
	A 2 Entities state	
	variables and scales	
	Agents/individuals	Agents in the model are operators and managers
		(Heads) which forms a team of operators
	Spatial units	Spatial units in the model are absent in the sense that
	Spanai anns	space (World) is used for visualizing the relations of
		objects (operators and managers)
		The space of the model is the space of perceptions the
		distance between the two agents is determined (during
		the interaction process) by the mutual perception
		between the agents.
	Environment	In the model there are no affecting (external) forces that
	2	drive the behavior and dynamics of all agents.
	Collectives	Collectives in the model are the groups (teams) of
		operators united by one Head (manager). The goal of
		group (literally - the Head) is to increase team
		productivity.
	A.3. Process overview and	In a two-level hierarchical structure (consisting of the
	scheduling	positions of managers and operators), persons holding
		these positions have a certain performance and the value
		of their own (personal) perception of each other.
		In the world of the model, which is the space of
		perceptions, agents implement two strategies:
		rapprochement with agents that perceive positively and
		distance from agents that perceive negatively (both can
		be implemented, one of these strategies, or neither, the
		other strategy, which makes the agent stationary).
		Strategies are implemented in relation to those agents
		that are in the radius of perception.
		The manager (Head) forms a team of agents. The
		performance of the group (the sum of the individual
		productivities of subordinates, weighted by the distance
		from the Head) varies depending on the position of the
		agents in space and the values of their individual
		productivities. Individual performance, in the current
		version of the model, are set as a random variable
		distributed evenly on a numerical segment from 0 to
		100. The manager forms the team 1) from agents that

		are in operational (organizational) radius, 2) among
		agents that the manager perceives positively and / or
		negatively (both can be implemented one of the
		angeified miles, on neither, which means the refused of
		specified rules, or neutrer, which means the refusal of
		the command formation).
		Agents can (with a certain probability, given by the
		variable PrbltyOfDecisn%), in case of a negative
		perception of the manager leave his group
		nermonently
		The electric second second backs the stabilization of
		The simulation experiment leads to the stabilization of
		the agents in space: the coordinates of the agents from
		a certain point in time become unchanged, and the
		group productivity stabilizes at a certain level.
		At the same time, characteristic for the behavior of
		agents in the model is the sporadic occurrence of cyclic
		structures (the spatial location of agents in which the
		soundington of source source and the group
		coordinates of several agents and the group
		performance of individual groups experience
		quantitative fluctuations). The appearance of such
		structures precedes full stabilization or, under certain
		initial conditions, oscillations can continue indefinitely.
		In this regard, the model operation time is formally
		limited to a period of 10,000 ticks. When stabilization
		occurs the experiment can be stopped by the user using
		the interface (dischling the "Co" button)
B. Design	B.1 Theoretical and	The model represents the first approximation to the
concept	Empirical background	implementation of the concept of mutual perception in
	Basic principles.	the hierarchy formulated by the author in the works:
		1. Ivan Smarzhevskiy. The concept of mutual
		perception of persons in a hierarchy. Journal of
		Economy and entrepreneurship, 2018, Vol. 12, Nom.
		12 р 1120-1124 (ИА Смаржевский Концепция
		взаимного восприятия персон, занимающих
		позиции в иерархической структуре. // Экономика и
		предпринимательство. 2018. № 12. С.1120-1124).
		Abstract. The issues of mutual perception of persons
		holding positions in the hierarchical organizational
		structure engaged in (some) operational activities are
		considered. Theoretical concents have been introduced
		considered. Theoretical concepts have been introduced
		and provisions have been formulated that reveal the
		and provisions have been formulated that reveal the interconnections of the individual perception of each
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established scales of measurement and potential values
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of aspects of perception is revealed depending on the
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of aspects of perception is revealed depending on the relative positioning of the positions of the perceiving
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of aspects of perception is revealed depending on the relative positioning of the positions of the perceiving and perceived persons in the hierarchy. The basic
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of aspects of perception is revealed depending on the relative positioning of the positions of the perceiving and perceived persons in the hierarchy. The basic statement of the concept is formulated: the essential
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of aspects of perception is revealed depending on the relative positioning of the positions of the perceiving and perceived persons in the hierarchy. The basic statement of the concept is formulated: the essential content of perception by person A of person B is
		and provisions have been formulated that reveal the interconnections of the individual perception of each other by persons. Aspects (sides) of perception are established, scales of measurement and potential values of aspects of perception are defined. The significance of aspects of perception is revealed depending on the relative positioning of the positions of the perceiving and perceived persons in the hierarchy. The basic statement of the concept is formulated: the essential content of perception by person A of person B is completely exhausted by three aspects: personal

	professional perception. These aspects are not reducible
	to each other.
	2. Ivan Smarzhevskiy. The development of the
	concept of mutual perception of persons in a hierarchy:
	the dynamics of perceptions. Journal of Economy and
	entrepreneurship, 2019, Vol. 13, Nom. 1, p. 830-833
	(И.А. Смаржевский, Развитие концепции взаимного
	восприятия персон в иерархической структуре:
	динамика восприятии // Экономика и
	предпринимательство. 2019. № 1. С. 830-833.)
	Abstract. The work develops the concept of mutual
	perception of persons holding positions in a hierarchy
	engaged in (some) operational activities. The potential
	dynamics of the social and personal aspects of
	perceptions are investigated. As applied to the
	simplified case (the professional aspect of perception is
	accepted unchanged), the most probable combinations
	probable ways of changing such combinations are
	established (routes in the "personal y social" perception
	matrix) The second main statement of the concept is
	formulated: in the case of individual personnel
	decisions the dynamics and mutual influence of aspects
	of the person's perception, which is the object of the
	decision, the decision maker determines the content of
	the (personnel) decision itself.
Emergence	The main result observed in the simulation is the
0	sporadic occurrence of cyclic structures (the spatial
	location of agents in which the coordinates of several
	agents and the group performance of individual groups
	experience quantitative fluctuations). The appearance
	of such structures precedes full stabilization (when from
	a certain time, the coordinates of the agents' no longer
	change) or, under certain initial conditions, oscillations
	can continue indefinitely.
	Stabilization occurs during a time period from 200 to
	(approximately) 3000 ticks. Stabilization time depends
	on the number of agents, values of perception radius and
	operational radius (PerRadius, OpRadius) and the
	speed of agents moving in the process of implementing
	their individual strategies.
<b>B.2.</b> Individual decision making $(A \neq a \neq $	
making (Adaptation)	Objective is group productivity, number of subordinates
Objectives	objective is group productivity, number of subordinates
	In groups and group composition dynamics.
	the survey in the model interface (plots figures on
	World window and digitals in Observer window see
	B 8 Observation section for details)
1	<b>D</b> .0. Observation section for details).

		-
	Learning	Managers are trained in the process of the model as follows: they remember the subordinates who were included in the team, but they took it down because they perceived the manager negatively. Such subordinates are included in the manager's list of "prohibited" and are not included in the team of this manager in the future.
	B.3. Individual prediction	Individuals do not predict future condition.
	B.4. Stochasticity	The value of the perception of each other by agents is defined as a random variable that has a normal distribution (distribution parameters are set by the control elements of the interface). Initial agent's coordinates in the World is random value.
	B.5. Observation	Reports: Group Productivity (for groups of Heads ## 0-6, plot) Group_Productivity_Per_Worker (for groups of Heads ## 0-6, plot) Total number of links between agents (plot). Free operators / managers (out of group's operators and Heads with no suborders) (plot). Agents with positive strategy (in the World window). Agents with negative strategy (in the World window). Perception of the person (agent) by other persons (in the World window). Perception of other persons (agents) by the person (in the World window). Group Productivity of all groups (numbers in Observer window). Suborders lists for all Heads (numbers in Observer window).
	B.6. Implementation Details	The model is coded in Netlogo 6.0.4, Open source and available on CoMSES (https://www.comses.net) If you mention this model or the NetLogo software in a publication, we ask that you include the citations below. For the model itself: Ivan, Smarzhevskiy (2019, June 18). "Organizational behavior in the hierarchy model" (Version 1.0.0). CoMSES Computational Model Library. Retrieved from: https://www.comses.net/codebases/3a538672- cc55-497c-8f9c-1f3a9522fcd1/releases/1.0.0/ Please cite the NetLogo software as: * Wilensky, U. (1999). NetLogo. http://ccl.northwestern.edu/netlogo/. Center for Connected Learning and Computer-Based Modeling, Northwestern University Evanston II
C. Details	C.1. Initialization	During the initialization process, data is generated for:
		<ol> <li>Agents quantity and coordinates</li> <li>Agents individual performance</li> </ol>

	3) Values of mutual	perception by a	gents of each
	other.		C
	It is possible in the mod	el to change on	the fly radii
	values, update the percept	ption value acro	oss the entire
	population and the percep	tion of an indivi	dual agent by
	its neighbors within the	perception rac	lius, and the
	probability values for a su	ubordinate to ma	ake a decision
	about leaving the group.		
	You can also change the	set of strategie	es for moving
	agents and strategies for r	ecruiting a team	manager.
	It is possible to add a	i randomness f	factor to the
	movement of agents	(Stoch_Motion	<b>_Speed</b> , the
	default is set to 0, that	at is, there are	e no random
	movements).		
C.2. Input data	The model does not use	input data to re	present time-
~ ~ ~ ~ ~ ~ ~	varying processes.		
C.3. Submodels			
setup	The procedure creates a s	specified number	ers (Quantity
	and <b>managers</b> ) of all agen	its and managers	s, sets random
	(from 1 to 100) values	of individual	performance.
noncontion	The procedure percep	tion.	ng list of all
perception	agents the values of their r	ne aution of all	other agents
	Values have a normal	distribution wit	h parameters
	NormMean NormStdDe		
90	Implements the simulation	n process	
50	Call procedure <b>connect</b> .		
	Realize (if select Attrac	ction is ON) f	or all agents
	positive strategy (moves	each agent to t	the geometric
	center (with coordinates (	(xpos ypos) of a	all agents that
	are positively perceived b	y this agent. For	rmula: <i>xcor</i> =
	(t * xpos + (1 - t) * xcor)	) set ycor (t * yp	pos + (1 - t) *
	ycor), where local variab	ble $t$ (equal 0.5,	value can be
	changed in model code) is	parameter that d	letermines the
	speed of moving agents in	the model Wor	·ld.
	Realize (if select Rejec	tion is ON) f	or all agents
	negative strategy (moves	each agent to t	the geometric
	center of all agents that are	e negatively per	ceived by this $(1) = (1) = (1)$
	ageint. Formula: $xcor = (-)$	$\cdot i + xneg + (I + xneg + (I + xneg + (I + xneg + (I + xneg + xn$	(i) = xcor) set
	$y_{cor}(-i)$ yring $+(i+i)$	changed in m	odel code) is
	narameter that determined	s the speed of n	noving agente
	in the model World	, the speed of h	ioving agoins
	Call procedures	set_strategy_	goals_wghtd,
	group_productivity,	head	d_behaviour,
	<b>OperatorsDecision</b> ,	t	eam_update,
	candidate_elimination,	with	probability
	PrbltyOfElimination%	call	procedure

	<b>candidate_elimination</b> and control end of experiment after the time has expired (ticks $= 10000$ )
compost	The procedure establishes connections (visualized by
connect	The procedure establishes connections (visualized by
	gray links) with all agents that are in the radius of
	current perception ( <b>Perkadius</b> ) for a given geometric
	arrangement of agents. The numbers of perceived (at a
	given point in time, for a given geometrical
	arrangement) agents are remembered in the list
	contacts_list.
set_strategy_goals_wghtd	The procedure determines the coordinates of the
	geometric centers (xpos ypos) of agents perceived by
	this agent positively and negatively. The coordinates are
	calculated taking into account the weights, which are
	the values of the perception of the other agents of each
	of the agents belonging to the first and second sets.
group_productivity	The procedure calculates the value of the group
	performance of each Head and stores it in the Head's
	attribute <i>my_group_productivity</i> . The formula is v =
	SUM (productivity * (59 - distancexy vpx vpy) / 59),
	where <i>productivity</i> is the individual productivity of
	each team member, distancexy vpx vpy is the distance
	between the team member and the Head (his
	coordinates is (vpx vpy)) and 59 is the maximum
	possible distance in the model's World.
head_behaviour	Depending on the position of the selects AskPOS and
	AskNEG, each manager chooses among the free (not
	subordinate at the moment other Heads) operators in
	radius <b>OpRadius</b> to which he percepts positive and / or
	negative. The numbers of the members are stored in the
	Head's attribute <i>suborders_list</i> . Belonging operators to
	a group is visualized by a red link.
OperatorsDecision	The procedure implements the individual behavior of
	the operator. If the operator perceives the Head
	negatively, then, with probability PrbltyOfDecisn%,
	the operator leaves his group. The Head remembers the
	number of such an operator (in the list <i>restrSbrdrs_list</i> )
	and, further, such an operator, even if he is free, will not
	be included in the group of this Head.
team_update	The procedure determines for each Head the operator
-	with the lowest performance, i.e. candidate for removal
	from the group. Operator number is stored in the Head's
	attribute <i>candidate</i> . If there are less than two operators
	in the group, the <i>candidate</i> is -1, which means there is
	no candidate for removal from the group.
candidate elimination	The procedure removes from the group the operator
	with the lowest performance (with number equal to
	candidate).
InvertPerceptonOfTurtle	The procedure inverts the perception of the agent with
·····	the number entered in the editing window <b>TurtleWho</b> .
	by agents that are at a distance from it <b>PerRadius</b> .

	show-value	Depending on the value of the selection ( <i>PosStrategy</i> , <i>NegStrategy</i> and so on), the procedure visualizes the attributes of the agents and the quantitative indicators of the model. Agents with positive strategy (figures in the World window). Agents with negative strategy (figures in the World window). Perception of the person (agent with number entered in the editing window <b>TrtlWho</b> ) by other persons (figures in the World window). Perception of other persons (agents) by the agent with number entered in the editing window <b>TrtlWho</b> (figures in the World window). Group Productivity of all groups (numbers in Observer window). Suborders lists for all Heads (numbers in Observer window).
		This procedure is recommended to run when the <b>Go</b>
	Stoch Motion Speed	button is off (when the model time is stopped).
	(button)	movement of agents ( <b>Stoch_Motion_Speed</b> , the default is set to 0, that is, there are no random movements).
References		Ivan Smarzhevskiy. The concept of mutual perception of persons in a hierarchy. Journal of Economy and entrepreneurship, 2018, Vol. 12, Nom. 12, p. 1120- 1124. (И.А. Смаржевский, Концепция взаимного восприятия персон, занимающих позиции в иерархической структуре. // Экономика и предпринимательство. 2018. № 12. С.1120-1124). 2. Ivan Smarzhevskiy. The development of the concept of mutual perception of persons in a hierarchy: the dynamics of perceptions. Journal of Economy and entrepreneurship, 2019, Vol. 13, Nom. 1, p. 830-833 (И.А. Смаржевский, Развитие концепции взаимного восприятия персон в иерархической структуре: динамика восприятий // Экономика и предпринимательство. 2019. № 1. С. 830-833.)