

Theories & Models of Scientific Communication

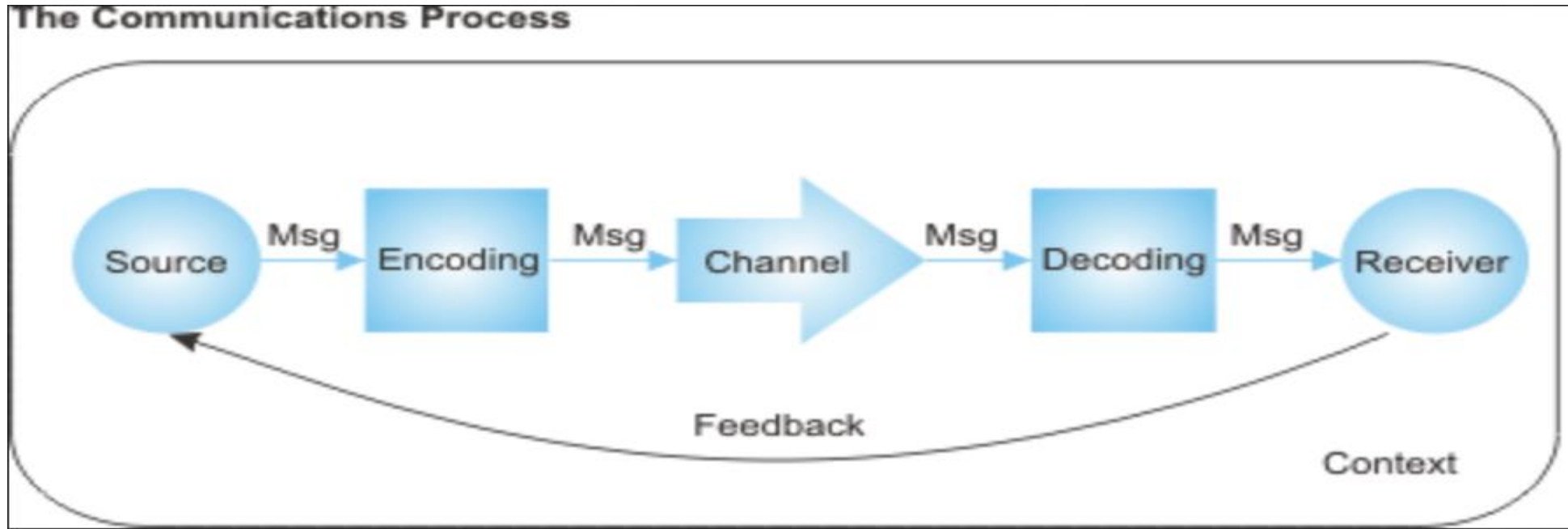
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Scientific communication: The processes



Research study

Research Article/manuscript
Policy brief

Scientific community
General Public
Policy Makers
Industry

Models of Scientific communication

Importance & Categories of Models in communication

- Communication is a complex process involving several considerations
- Models have been developed to help illustrate, delineate and depict the structural features of communicative acts
- 4 categories of communication models:
 - 1) **Transmission or linear models:** who says what, in which channel, to whom, with what effect? (sender and his/her message)
 - 2) **Ritual or expressive models:** communication is not just utilitarian but can be an end in itself (performative)
 - 3) **Publicity (attention/display) model:** to capture attention in order to sell a product
 - 4) **Reception model:** In any communication, multiple meanings can be derived by the receiver

1. Knowledge deficit model

Basic elements	Weaknesses
<ul style="list-style-type: none">• Scientists are experts and are knowledgeable• The public have a deficiency of knowledge. Delivery of simplified scientific information leads to public understanding and acceptance of science.• Transfer of knowledge is one way, from scientist to the public• Good transmission of scientific information leads to a reduced deficit in knowledge• A reduced knowledge deficit leads to better decisions, and often better support for science	<ul style="list-style-type: none">• Perception and utilization of scientific information is more complex than portrayed in the deficit model.• Overlooks importance of background knowledge and sociocultural circumstances in science communication• The public is not homogeneous. Reception of information will vary from person to person

Dissemination model or science literacy model

2. Contextual model

Basic elements	Weaknesses
<ul style="list-style-type: none">• Communication of science is considered to be based on the needs, attitudes and existing knowledge and situations of different audiences• Individuals respond to messages based on their unique circumstances• There is one-way transmission of information from scientists to the public• Audiences have ability to quickly gain knowledge about topics that are relevant to them	<ul style="list-style-type: none">• According to this model, communication is one way: no interaction between the source and recipient of knowledge• Absence of adequate opportunity for feedback

Public engagement model

3. Lay expertise model

Basic elements	Weaknesses
<ul style="list-style-type: none">• Acknowledges the local expertise and tacit knowledge possessed by communities through, for eg. Elders and other opinion leaders• Places emphasis on knowledge and expertise that is held and validated by social systems other than modern science• Places value on local knowledge as genuine expertise in its own right• Highlights interactive nature of scientific process	<ul style="list-style-type: none">• Undermines the expertise of scientists

4. Public engagement or participation model

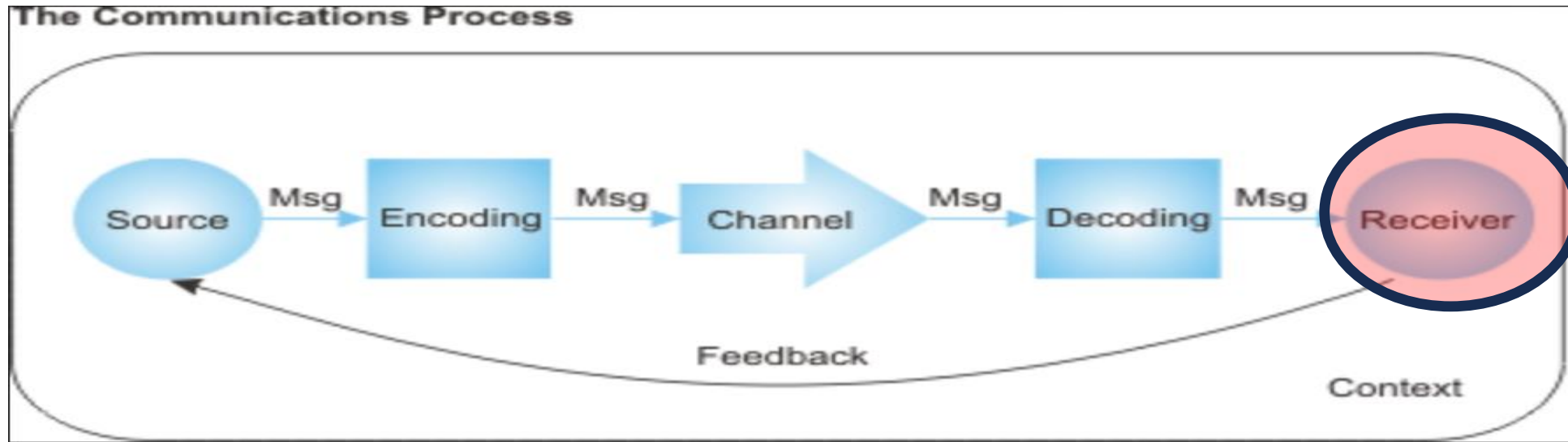
Basic elements	Weaknesses
<ul style="list-style-type: none">• Two-way flow of information between scientists, the public and policymakers• Communication strengthens relations between science and the public• Focuses on policy issues involving scientific and technical knowledge• Tied to democratic ideal of wide publicity participation in policy process• Builds mechanisms for engaging citizens in active policy making• Real public authority over policy and resources	<ul style="list-style-type: none">• Diminishes the scientist's power• Citizens can participate in a more emotional than rational way, which can undermine the objective of communication• More complex, and therefore difficult to explain to donors and policy makers

Theories of Scientific communication

Importance of theories of scientific communication

- Theory refers to a tested set of concepts, explanations, or principles that make up the body of knowledge in a field of study
- Theories explain phenomena or predict outcomes by describing the relations between variables
- Theories of communication can help
 - in predicting how people are likely to receive, perceive, and respond to information about science.
 - support the appreciation of recommendations regarding the basic principles of effective scientific communication
- Four (4) selected theories of scientific communication

1. Reception theory (Stuart Hall)



While reading "encoded text" audiences may interpret or "decode" them in different ways

The producer of the message may have a "preferred or dominant reading"

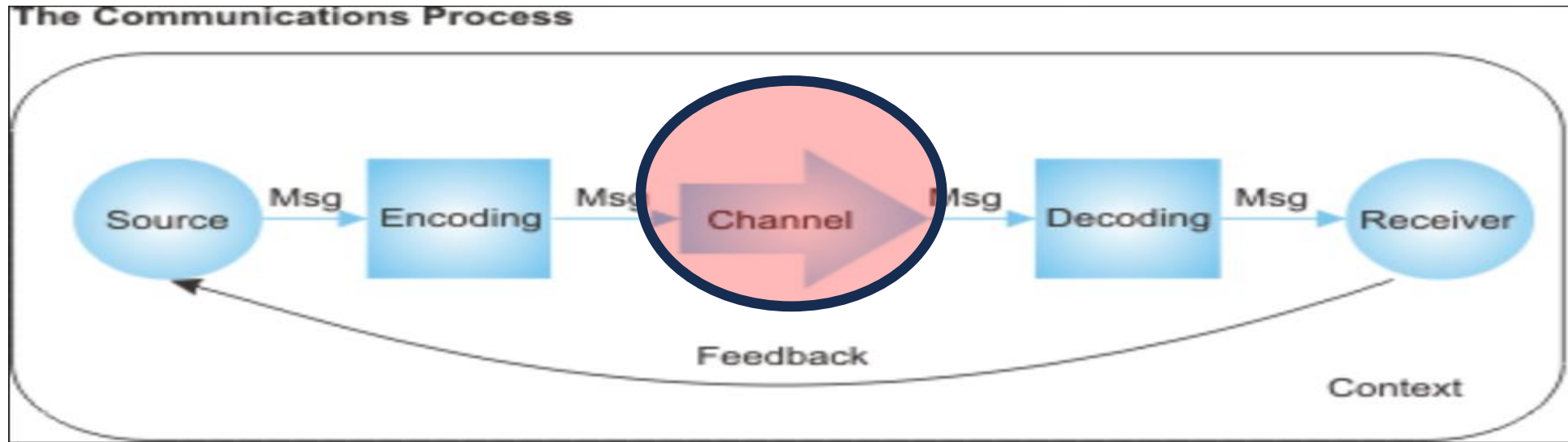
The audience may have "alternative interpretations of the message" = "negotiated meaning" which may differ from the original meaning : Encoding-decoding of discourse

Strength: focuses on the individuals in the mass communication process and it respects the intellect and ability of media consumers

It helps us to pay attention to the characteristics of the receivers of messages for better encoding of messages

Weakness: audience feedback is usually subjective.

2. Agenda-setting theory

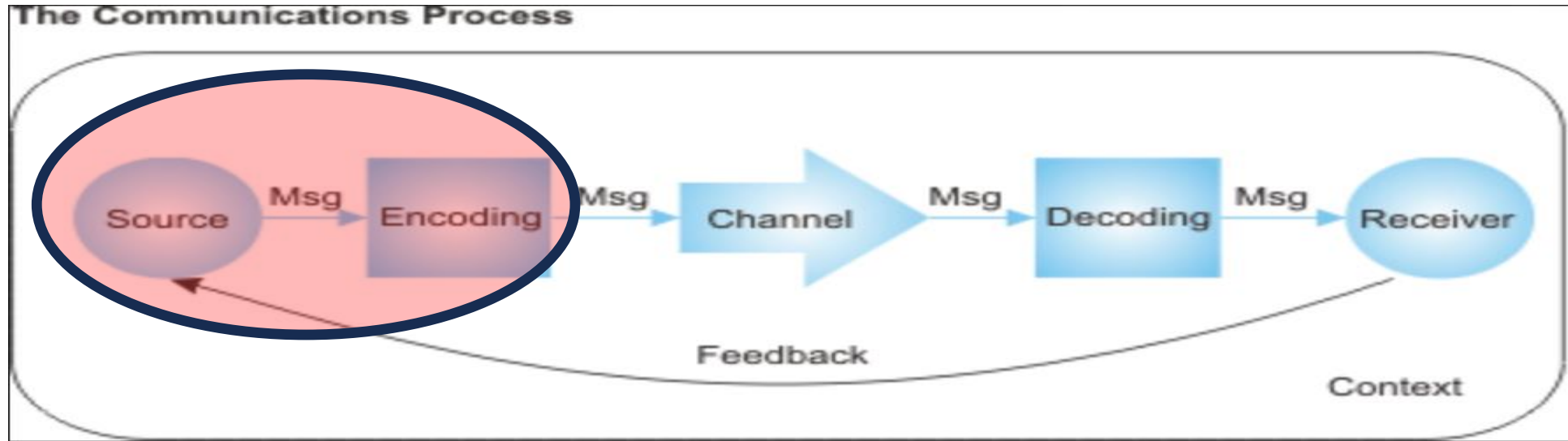


Premise: The scientific issues and topics that the media decide to focus on inevitably become part of the public's agenda (e.g. herbal advertisement)

This theory emphasizes the power of the media in guiding people on what to think about, but also recognizes the agency of the public in deciding for themselves what to think

Strength: We can harness the media to direct the discourse of critical public health issues e.g. COVID-19

3. Framing theory: Entman (1993)

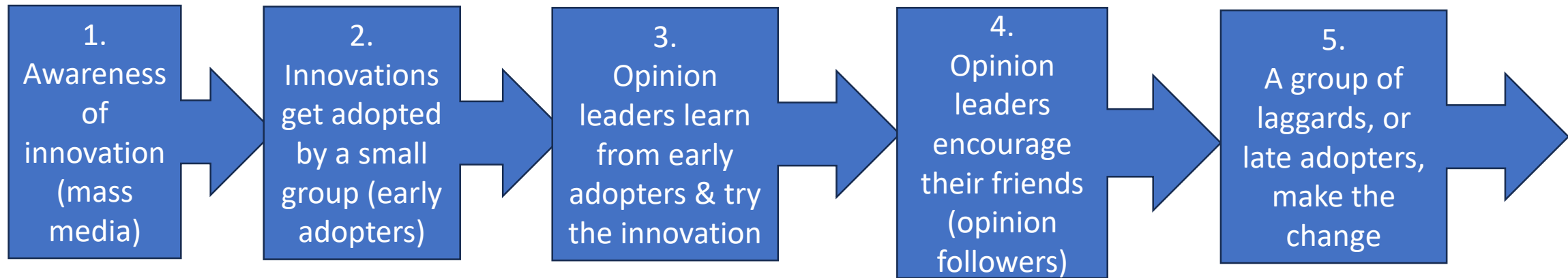


Premise: “To select some aspects of a perceived reality and make them more salient in a communication text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation”

The schema of interpretations that enables individuals to: perceive, organize, and make sense of incoming information. Valkenburg et al. 1999

Strength: Helps the sponsor to influence at different levels how an issue is considered for action

4. Diffusion of innovations theory (Rogers, 1995)



Four (4) stages proposed by McQuail and Windahl, 1993):

- 1. Knowledge:** the individual is exposed to an awareness of the existence of the innovation so as to gain understanding of how it functions
- 2. Persuasion:** the individual forms a favourable to unfavourable attitude towards the innovation
- 3. Decision:** the individual engages in activities which lead to a choice to adopt or reject the innovation
- 4. Confirmation:** the individual seeks reinforcement for the innovation decision he or she has made, but but may reverse the previous decision if exposed to conflicting messages about the innovation

Criticism: Top to down approach

CONCLUDING THOUGHTS

- Theory helps predict how people are likely to receive, perceive, and respond to information about science
- Scientific communications seeks to achieve one or more of the following: to inform, persuade, consult or engage the public or policy makers
- Theories and models of scientific communication are aligned to these purposes of communication

CONCLUDING THOUGHTS

- Normative theories applicable to science communication include reception theory, agenda-setting theory, framing theory, & diffusion of innovation theory
- Four key models of scientific communication: knowledge deficit model, contextual model, lay expertise model and participation model are interrelated and not mutually exclusive

THANKS