

Why and how I am involved in popular science

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I consider the dissemination of scientific knowledge towards the society, and in particular bi-directional interaction with the general public about science and technology, as a very important part of my activity as a researcher. I explain here the goals, the targeted public(s), the strategy to reach those goals and these publics, and list selected contributions.

For what goals? There is today an important gap between science/technology and society, and topics related to robotics are paradigmatic of this gap. There is on one hand a general lack of culture and interest in science and technology, which is problematic because many persons do not have the knowledge to understand fundamental aspects of the world in which they live. It is also problematic for the future of science and economy since it depends on young generations who are difficult to motivate into science studies. There is on the other hand, for a significant portion of the population, also a negative view of science, technology and of the notion of “progress”, partly inherited from the 20th century reaction to both scientism and certain military applications.

This can be especially observed in the fears often expressed by the occidental general public about research and technology related to robotics, grouped in three families: 1) robots may take the jobs of humans, increasing unemployment; 2) the use of robots in society, for example as helpers for the disable in assistive robotics, might lead to the “robotization” of people’s mind, alienating us, and risking to replace human contacts and relationships; 3) scientist may loose control of robots, which could autonomously provoke high damages in the world.

Those fears about robot-related science and technology are in particular fostered by three kinds of processes, against which scientists have to act: 1) The imaginary of occidental people is highly influenced by science-fiction novels and movies which extremely often present robots (and the act of creating robots) as the source of major societal problems; 2) The general press and media, through sensationalism, often propagates highly erroneous visions about the state-of-the-art in robotics as well as about the goals of research projects; 3) Companies in the ecosystem of the growing personal robot industry often communicate equally erroneous visions about the state-of-the-art in robot technologies.

Thus, in order to address these issues, **my goal is three-fold**:

- 1) **Explain and de-mystify** to the general public what is the state-of-the-art, what are the main concepts, and what are the *goals* and future direction of research related to robotics. In particular, explain the huge fundamental scientific challenges that are still unsolved before autonomous intelligent robots can arrive in everyday life; But also explain the potential current and future *ethical questions* arising from technological development;
- 2) **Foster the interest and curiosity** of the general public towards both the potential positive applications and the fundamental questions attacked by this research (in particular, show that robots are not only a technology for useful practical applications, but they can also be used as scientific conceptual tools for addressing fundamental questions about the nature of humans and of the living in general, e.g. for understanding the evolution of languages);
- 3) **Obtain feedback from society** about my own research activity: confronting one’s own research activities directly to society, and getting feedback, is extremely useful to take a step back on this research activity and ensure it is grounded enough into the social, economic and humanist projects of society, which funds this research.

Towards which public(s)? In this context, there are two broad families of publics that I target, each requiring different modes and channels for scientific mediation:

- 1) The public who is already positively and actively sensitive to science and technology, e.g. buys and reads spontaneously popular science magazines, or regularly goes to events like “Fêtes de la Science/Bars des sciences”;
- 2) The public for whom scientific culture is outside common pre-occupations (voluntarily or not), ranging from educated populations with humanities and/or artistic backgrounds, to populations in low-class socio-economic groups (which themselves require differential strategies for scientific mediation).

How? For the different families of publics that I target, I use accordingly different modes and channels of scientific mediation, trying globally to maximize at the same time the quality of the message that is received and the number of people receiving it.

For the “science sensitive” public, I use the following traditional modes and channels of interaction:

- 1) I write articles and respond to interviews in popular science printed and web magazines (e.g. La Recherche, Sciences et Avenir, Pour la Science, Tangente, New Scientist, Interstices, Futura Sciences, ...);
- 2) Together with my students, I participate every year to several events like “Fêtes/Bars de la Science”, giving talks and demonstrations;
- 3) I participate regularly to science exhibitions in CCSTIs (e.g. Cité des Sciences et de l’Industrie, Cap Sciences, ...);
- 4) I participate to the making of videos and podcasts dedicated to this public;
- 5) I foster press reports about the work of my team in science/technology general printed and web press (e.g. New Scientist, La Chaine Techno, Sciences et Vie, Le Monde Informatique, Wired, Le journal du geek, Engadget,...), providing materials and *re-reading* whenever this is possible.

For the “non sensitive/non pro-active” public, I mainly try to use either generalist channels of diffusion/interaction, but also explore channels usually attended by publics with humanity/art interests:

- 1) I regularly participate to generalist, relatively high-audience, radio and TV programs through interviews or panel discussions, especially among “service public” channels (e.g. France Inter, France Culture, France Info, France 5, ...);
- 2) I have participated several times to important exhibitions about scientific topics organized in art museums, and showing scientific research in a different way and to a different public than in science museums (e.g. recently at Fondation Cartier pour l’Art Contemporain, where the exhibition was yet associated with a rich set of associated events achieving more traditional scientific mediation), and in this context have collaborated with several artists;
- 3) I foster press reports about the work of my team in generalist high-audience TV, radio and press (e.g., Euronews, CNBC, TF1, France 2, BFM TV, France Info, RFI, Le Point, Le Figaro, Les Echos, Financial Times, Metro, Direct Soir, Ouest France,...), providing materials, explanations to the journalists who produce the content, and re-reading whenever this is possible.

Measuring the audience. In 2011, the programs in which I was interviewed/personally participated on France Inter, France Info and France Culture were heard by approximately 450000 persons (source: Médiamétrie), and the programs on various TVs and radios (CNBC, TF1, France 2,...) which reported the work of my team were heard by over > 1 million persons. The exhibition at Fondation Cartier in 2011-2012, displaying the Ergo-Robots, and with mediator students permanently present next to them for explanation, was visited by around 50000 visitors. Individual issues of Sciences et Avenir, where I wrote one article in the Hors-Série jan. 2012, are read by around 150 000 persons.

Fostering scientific mediation in young researchers. I also dedicate efforts to training young researchers in my team (especially PhD students) to achieve scientific mediation, in particular by pushing them actively to participate to Fêtes de la Sciences (demos and talks), through welcoming regularly school classes that come to visit Inria, and through having them supervise every year several one-week internships college students.

Selected contributions for scientific mediation

An extended list of my contributions is available at : <http://www.pyoudeyer.com/popularScience.htm>

Selected popular science articles

- Oudeyer, P-Y. (2012) [GX-29 n'est pas un objet comme les autres](#), *Sciences et Avenir Hors-Série*, dec/jan 2011-2012, "Qu'est-ce-que l'homme".
- Oudeyer, P-Y. (2011) [Curiosité et Langages](#), *Catalogue de l'exposition « Mathématiques : Un Dépaysement Soudain »*, Fondation Cartier pour l’Art Contemporain, Paris, France.
- Oudeyer, P-Y. (2011) [Aux sources du langage, dans le cadre de l'exposition virtuelle](#), *Exposition numérique « Au rendez-vous de langues »*, Cap Sciences, CCSTI Bordeaux, France (texte adapté de "Des robots pour comprendre le langage", Futura Sciences.com).
- Oudeyer, P-Y. (2009) [Les grands défis de la robotique du 21ème siècle: science, technologie, et société](#), *Rapport de la Cité des Sciences et de l'Industrie*, Paris, France.
- Jongwane, J., Oudeyer, P-Y. (2009) [A propos de l'apprentissage des robots \(Podcast\)](#), *Interstices*.
- Oudeyer, P-Y. (2008) [Un robot très curieux \(Entretien\)](#), *La Recherche*, nov. 2008, numéro 424.
- Kaplan F. and Oudeyer P-Y. (2006) [Un robot curieux](#), *Pour La Science*, no. 348, octobre 2006.
- Oudeyer, P-Y. (2006) [Où vont les robots ? Science et Devenir de l'Homme](#), *Lettre aux générations 2000*, association Mouvement Universel de Responsabilité Scientifique.

- Oudeyer, P-Y. (2006) [Des robots aux sources du langage](#), *Sur les chemins de la découverte*, coord. par Farouki, N., Presses Universitaires de France.
- Oudeyer, P-Y. (2005) dossier "Des robots pour comprendre les origines de la parole", sur futura-sciences.com

Selected participation to generalist radio and TV programs

- 2012 : [La robotique pour mieux comprendre l'homme](#), (Interview, 45 mn), Emission « Continent Sciences » de Stéphane Deligeorges, **France Culture**.
- 2012 : [Robotique et Sciences Cognitives](#) (Interview, 5 minutes), **France Info**.
- 2011 : [L'apprentissage des robots](#) (Interview, 1h33), « On prolonge l'émission avec l'INRIA », Emission de De la Porte, X., **France Culture.com**.
- 2011 : [Les mystères des mathématiques, et les robots et la curiosité](#), Emission « 3D, Le journal » de Stéphane Paoli, **France Inter** (panel discussion : Bourguignon, J-P., Casse, M., Chandès, H., Chemla, N., El Karoui, N., Oudeyer, P-Y.).
- 2011 : [Robots : invasion imminente ?](#) Emission « On verra ça demain » de Daniel Fievet, **France Inter** (panel discussion : Guillot, A., Maisonnier, B., Oudeyer, P-Y.)
- 2006 : [L'intelligence peut elle être artificielle](#), Emission Science Publique de Michel Alberganti, **France Culture**. (panel discussion : M., Ganascia, J-G., Oudeyer, P-Y., Sebag, M., Steels, L.).
- 2002 : Images et sciences du langage, reportage de J-P. Mirouze, **France 5** (and used as a support in schools) <http://www.pyoudeyer.com/lacinqieme.html>

Selected popular science talks

(This selection was made to illustrate the kind of places where I regularly give general public presentations)

- (30th january 2012) Les modèles robotiques: un nouveau langage pour comprendre le vivant, Colloque "[Mathématiques pour tous?](#)", organisé par l'UNESCO en partenariat avec l'IHES et la Fondation Cartier pour l'Art Contemporain, **UNESCO**, Paris, France.
- Oudeyer, P-Y. (2010) [Où vont les robots? Quelques défis de la robotique personnelle](#), *Cité des Sciences et de l'Industrie*, journée "[Des robots et des hommes](#)", Paris, France.
- (2nd december 2010) [Commentaires sur le film "Woody et les Robots"](#), *Festival Cinémasciences*, CNRS, Bordeaux.
- (30th november 2010) Atelier "[Les robots au cinéma](#)", *Festival Cinémasciences CNRS*, Cap Sciences, Bordeaux.
- (28th may 2007) Un robot peut-il être curieux, *Chapiteau des sciences, fête de LO*.
- (2 dec. 2006) "Quand les machines se mettent à parler", *Théâtre des Sciences, Musée Cap Sciences*, Bordeaux.
- (7 dec. 2005) "L'origine des formes du langage: auto-organisation, métaphores et machines", *Café des Arts et des Sciences*, FNAC Digitale, Paris.
- (16 oct. 2005) "Les robots à la conquête du langage", *Espace Landowsky, Exhibition I live Tomorrow*, Boulogne-Billancourt, France.

Selected popular science videos

- Langlois, A., Ly. O., Oudeyer, P-Y. (2012) Le déséquilibre de l'apprentissage, Inria. (selected in category "hors-compétition" at [Festival du Film de Chercheur](#) à Nancy, to be used as support in schools). <http://videotheque.inria.fr/videotheque/doc/737>
- Courbatze, J-P., Fievet D. (2012) Le tour des labos par Nao le robot, Universcience TV. (also published on LeMonde.fr) <http://www.universcience-vod.fr/media/3280/le-tour-des-labos-par-nao-le-robot.html>

Selected Museum installations/exhibitions and demonstrations

- 2011-2012: Participation to exhibition "[Mathématiques: Un Dépaysement Soudain](#)" at *Fondation Cartier pour l'Art Contemporain* (Paris, France) through the [Ergo-Robots Experiment](#), and collaboration with film maker [David Lynch](#).
- 2010-2012: Elaboration of two projects as "associate scientist" with two groups of artists to design joint pieces ("spectacles vivants") of technologies/art to be shown in public spaces (with [C2M1](#) group in Boulogne-Billancourt, lead by [Magali Desbazeille](#) and Siegfried Canto, PLDV artistic group in Bordeaux, lead by Anne-Karine Peret).
- 2010 (April-Sept): Organization with my team of [regular public demonstrations](#) and public robot experiments at [Cap Sciences](#), Bordeaux, France (25 full days of public demonstrations).
- 2010-2012: Organization with my team of [several robot demonstrations at "Fête de la Sciences"](#) in Bordeaux and Paris.
- 2009: Installation and demonstration of [Acroban the humanoid](#) and Flowers Fields robot at the [Science Museum, Napoli](#), Italy, for the robotics exhibition "Futuro Remoto".
- 2001 – 2002: Installation "[Maïdo and Gurby](#)" at *Cité des Sciences et de l'Industrie* in Paris, during the exhibition

« L'homme transformé », for a period of 2 years, presenting robots which invented culturally a system of speech sounds.

- 1999 – 2000: I participated in the setting up of the installation of the Talking-Heads Experiment in a network of museums including *Palais de la Découverte*, Anvers Laboratorium, Kettle's Yard in Cambridge and Welcome Trust in London.

Interviews and journalist reports on TV, radio, newspaper and general press

List available at: <http://www.pyoudever.com/press.htm>