ÉCOLE D'ÉTÉ MÉDECINE ET HUMANITÉS

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INTELLIGENCE ARTIFICIELLE ET RELATIONS EN SANTÉ EN TEMPS DE PANDÉMIE

Programme Internationale de Formation en Médecine et Humanités

Université Claude Bernard Lyon 1 et Faculté de Médecine Lyon Est

Faculté de Médecine Lyon Est

uOttawa

En partenariat avec l'Université de Médecine d'Ottawa, l'Ecole de Médecine de l'Université de Médecine de Jiao Tong à Shanghai, l'Université de Médecine Chinoise de Shanghai.

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Faculté de Médecine Lyon Est

INTRODUCTION

à la formation internationale aux Humanités Médicales

Le programme international Médecine et Humanités a été initié en 2016 à Lyon en présence des partenaires universitaires de Shanghai et d'Ottawa. Quatre sessions se sont déroulées jusqu'en 2019. La première a été organisée par l'université d'Ottawa en Juillet 2017. La seconde fut organisée à l'université de Lyon en Juillet 2018, sous la direction pédagogique de Nicolas Lechopier, sur le thème de la sensorialité. La troisième fut proposée par l'école francophone de Médecine de l'université JiaoTong et l'Université de Médecine Traditionnelle Chinoise de Shanghai, sur le thème de la médecine intégrative. L'école d'été de 2020 annonçait un nouveau cycle de ce programme international. Plus qu'une nouvelle page, il fut l'expérience d'une adaptation pédagogique profonde en réaction à la crise pandémique mondiale.

Les crises apparaissent parfois comme des moments d'opportunités et de changements. Ainsi a été lancée la première forme virtuelle de l'école d'été de Médecine et Humanités en 2020, entre les universités de Lyon et d'Ottawa. Cette 4ème école d'été fut l'occasion de traiter le thème de l'Intelligence Artificielle et des relations en santé dans le contexte de la pandémie. Les contraintes de temps de connexion virtuelle dues au décalage horaire, le manque des rencontres humaines en présentiel ou encore l'effort pour s'adapter à de nouvelles technologies de communication ont été compensés par la qualité de nos intervenants et la pertinence des échanges produits par nos participants. L'équipe organisatrice lyonnaise pilotée par le Professeur Jérôme Etienne, les Docteurs Michèle Germain et Marion Cortet et coordonnée par Marceau Chenault aura permis d'orienter les quatre tuteurs et huit étudiants en médecine de l'Université de Lyon et Saint-Etienne vers des interactions fructueuses avec leurs partenaires canadiens.

Cette session fut inédite pour au moins trois raisons. Elle aura nécessité une adaptation rapide et non planifiée en contexte de crise pandémique. Elle nous aura fait faire le pas d'un enseignement virtuel à l'international avec ses limites mais aussi ses avantages. Enfin, nous aurons abordé un sujet délicat car complexe et souvent mal connu, celui de l'Intelligence Artificielle dans le champ de la santé. Pour toutes ces raisons l'école d'été 2020 fut une expérience riche et inédite dans l'évolution du programme de formation des Humanités Médicales.

L'ÉQUIPE D'ORGANISATION DE L'ÉCOLE D'ÉTÉ 2020

Pr. Jérôme Etienne, Dr. Michèle Germain, Dr. Marion Cortet, Dr. Marceau Chenault.

PRÉSENTATION DES ENCADRANTS ET PARTICIPANTS

L'équipe de l'Université de Lyon – Saint-Etienne était organisatrice pour la session 2020. Elle se composait de quatre encadrants : **Pr. Jerôme Etienne, Dr. Michèle Germain, Dr. Marion Cortet et Dr. Marceau Chenault**.

Les cinq tuteurs et tutrices étaient également tout.e.s étudiant.e.s de l'université de Lyon et ont joué un grand rôle de médiateur entre l'équipe organisatrice et les participants : **Radamis Barroso, Léa Ruelle, Mehdi Lehlali, Ali Chour, Pauline Jannon**.

Enfin les huit participants étaient des étudiants en médecine des facultés de Lyon Est ou de Saint-Etienne: **Estela Castillon, Barbara Duplaix, Océane Laboureau, Raphaël Lescar, Maël Plemert, Rémy Ouedraogo, Margot Berne, Noémie Bouzerar**.

L'équipe de l'Université d'Ottawa était pilotée par le **Dr. Francis Backewell**, directeur du programme des Humanités Médicales, avec l'aide de **Kristina Laperle** du service des Relations Internationales.

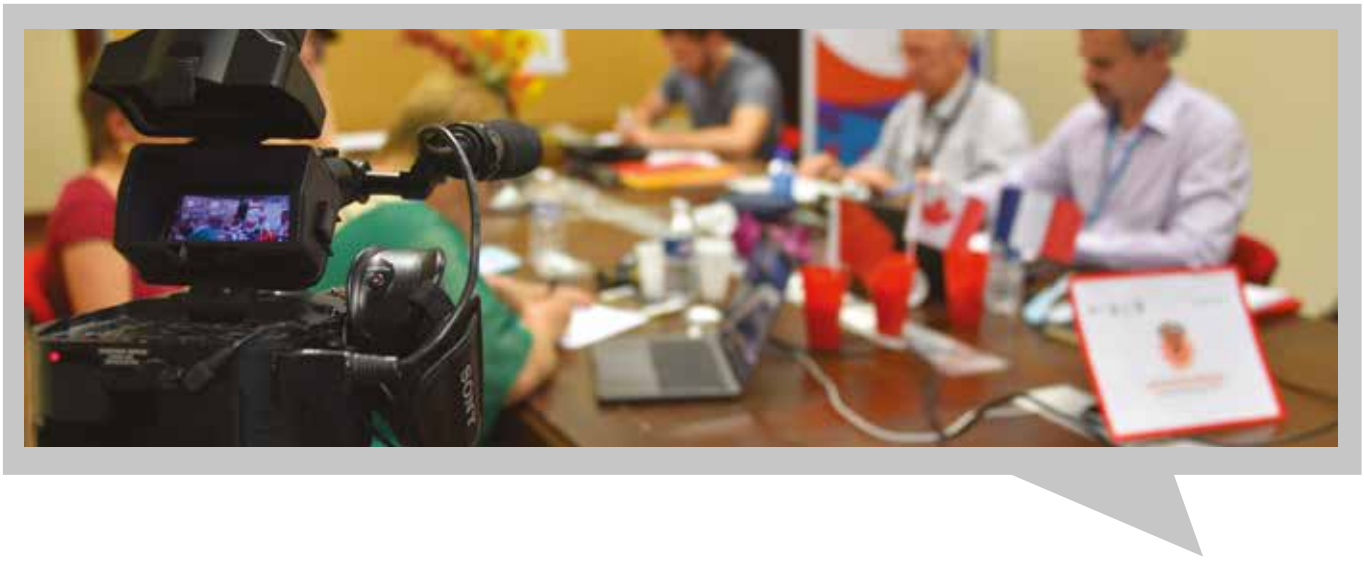
Sept étudiants se sont investis dans les échanges avec l'équipe française, tou.te.s étudiant.e.s en médecine également : **Taki Jade, Francis Demontigny, Oliver Fung, Shabana Jamani, Christina Yan, Rahul Kapur, Jake Ranot**.

PRÉSENTATION DES INTERVENANTS

Cinq intervenants ont été sollicités pour, d'une part, assuré les deux conférences d'ouverture de l'école d'été sur le thème de l'Intelligence Artificielle et, d'autre part, apporter un regard critique et constructif sur les présentations finales des groupes d'étudiants.

Elodie Giroux, Maître de Conférence en philosophie à l'université de Lyon 3 a assuré la conférence d'ouverture sur «les enjeux épistémologiques et éthiques de l'IA en Santé. **Guillaume Lio**, chercheur à l'Institut de Sciences Cognitives Marc Jeannerod, a présenté la deuxième conférence d'ouverture : *« Intelligence artificielle et diagnostic médical : est-ce que les ordinateurs vont remplacer les médecin? »*.

Finalement trois chercheurs nous ont rejoins lors des tables rondes finales pour commenter les travaux étudiants, avec Guillaume Lio : **Isabelle Tommassi**, doctorante à l'ENS de Lyon 2 sur les situations de post-catastrophe, **Bernard Andrieu**, professeur en philosophie du corps à l'université Paris Descartes, et **Didier Vinot**, Professeur en sciences du management de la santé, vice doyen de l'université de Lyon 3.



GUILLAUME LIO

Chercheur à l'Institut de Sciences Cognitives, Lyon 1 - CNRS.
Conférence :
« Intelligence Artificielle et diagnostic médical : est-ce que les ordinateurs vont remplacer les médecins ? »

ELODIE GIROUX

Maître de conférence à l'Université de Lyon 3, Philosophie de la médecine
Conférence :
« Enjeux épistémologiques et éthiques de l'IA en santé »

BERNARD ANDRIEU

Professeur à l'Université Paris Descartes
Philosophie du corps
« Autosanté : vers une médecine réflexive» (2012)

DIDIER VINOT

Professeur et vice-doyen à l'Université Lyon 3
Sciences et management de la santé

ISABELLA TOMASSI

Doctorante à l'ENS Lyon 2,
Géographie et sociologie des situations post-catastrophes

COMPTE RENDU DES EXPOSÉS ET DISCUSSIONS

Les présentations des différents groupes d'étudiants ont donné lieu à des discussions riches, impulsées par les critiques proposées par les intervenants invités. Nous restituons dans cette partie un compte-rendu détaillé des échanges et commentaires qui ont eu lieu suite aux présentations données sur le thème générale de « l'Intelligence Artificielle (IA) et les relations en santé en pandémie». Les cinq thèmes abordés furent respectivement:

- **L'information, la sécurité et la transmission des «fausses informations»**
- **L'intelligence artificielle et le transhumanisme**
- **Les interfaces entre soignants et soignés**
- **l'usage de L'intelligence artificielle dans le champ de la gériatrie**
- **L'intelligence artificielle en médecine: catalyseur ou remède des disparités sociales**

1. INFORMATION, SÉCURITÉ ET TRANSMISSION

PARTICIPANTS : *Rémy Ouedroguo (Lyon Est), Christina Yan (Ottawa), Noémie Bouzerar (Lyon Est), Ali Chour (Tuteur, Lyon Est).*

THEME: Alors que l'IA et les "fake news" sont de plus en plus présentes aujourd'hui, comment l'accès aux information (factuelles ou non), impacte la capacité du patient à donner son consentement, si toutefois cela peut toujours être considéré comme un consentement éclairé? Les médecins ont-ils la responsabilité éthique, en tant qu'acteurs de l'éducation du patient, d'aborder les questions relatives à la désinformation en ligne, et de délivrer des soins basés sur les preuves?

TANSMISSION AND SECURITY

RÉSUMÉ : Alors que l'IA et les "fake news", ou fausses informations, sont de plus en plus présentes aujourd'hui, notre accès à l'information a de plus en plus d'impact sur nos prises de decisions, dans beaucoup d'aspects de nos vies. Durant cette épidémie de COVID-19, la désinformation médicale est monnaie courante, et ce sous une pluralité de formes ; depuis le sentiment de peur entretenu par les messages des réseaux sociaux, aux articles scientifiques de mauvaise qualité publiés dans des journaux scientifiques pourtant réputés. En tant qu'acteurs de l'éducation du patient, les médecins ont le devoir moral de prendre en considération cette désinformation en ligne afin de pouvoir administrer des soins basés sur les preuves. Un entretien approfondi avec un médecin a été mené, pour mieux comprendre comment les fausses informations ont impacté les soins administrés aux patient durant l'épidémie. Devant le manque de preuves scientifiques de qualité, les médecins ont rencontré des difficultés à faire face aux idées fausses des patients concernant la COVID-19. De plus, l'absence actuelle de consensus concernant les traitements du COVID-19 a amené la population générale à s'interroger davantage sur l'expertise et l'opinion professionnelle des médecins. Etant donné que les patients et les médecins n'ont pas accès à des données fiables et à long terme sur la COVID-19, les décisions des patients fondées sur de la désinformation ne peuvent pas être considérées comme un véritable consentement, car les médecins sont mal équipés pour traiter efficacement les idées fausses répandues. Cependant, les médecins ont toujours la responsabilité de se tenir au courant des données scientifique disponibles à l'heure actuelle, et de communiquer ces résultats aux patients de manière claire. À l'heure actuelle, les médecins se renseignent également d'eux mêmes sur la recherche liée à la pandémie de COVID-19 et s'en remettent aux recommandations des spécialistes des maladies infectieuses.

Commentaire de la présentation par Bernard Andrieu, Guillaume Lio puis Isabella Tomassi.

So thanks so much for this very rich presentations, all of you. It's quite dense and rich. It is not so much a surprise, because with all the discussion we had for four weeks with the tutors and the teachers, it was already quite dense. So we were expecting this kind of very rich presentations. Now, because we have the chance to have three guests, Bernard Andrieu, Gillaume Lio, Isabella Tomassi, and I see also we have an anthropologist from Nice, Nancy Midol, and we have also a doctor from Nice, Véronique
Mondain, so we will start now the discussion and give the floor to Bernard Andrieu, if you want to start, maybe?

BERNARD ANDRIEU : I think that this first paper is very interesting, about the problem of the reason of believing a fake news. And I think perhaps we have a history of this problem in the philosophy of Plato, in the Republic, about the problem of the perception of fake in the cavern. And I think we have the problem of the difference between the paradigm, the model and the image of this model and the copy of the copy. I think that we have a problem to -pour qualifier- to qualify the person who produces this fake news. Plato uses the term of sophist. And I think that we have a contradiction between the (will) of truth and the (will) of lie, of false information. And the problem is to evaluate, and we have exposed the very good reason of that, by emotion, by the difficulty to deconstruct misconceptions. The problem is also the education of the media in the population. And the problem of this impact of fake news, it's very difficult when you have a perspective like the COVID. Because this COVID is different from SRAS or Chernobyl, because we are very uncertain of if we have or we have not the contamination of this disease. And this difficulty to certify our relation with the disease perhaps is one of the reasons for the many acceptations of fake news, because we have sort of disturbance in body living experience of the subject, and we have no possibility to make the difference, because my existence, my life, or the life of my family is very endangered by the diffusion of this malady. And the conditions of awareness are very, very difficult in this (condition). I think perhaps we have a possibility with your work to understand the different levels of the impact, but perhaps with an embodyment perspective, we can describe the different levels with the persons infected or persons not in a situation of contamination. And I think we have (inaudible) the possibly to describe the different powers of fake news into the understanding. The last point of this paper is the problem of educating population. How we can educate the population. The problem in France is the confusion about the power of physicians, in the media, because we have a special physician committee, a scientific committee

by the government and we have a problem of, well, who is who? Where is the scientific expert? Where is the media expert? Where is the educational expert? But is it the same person. In the media, it's the same person, and we have a sort of continuity, and without the work of the vulgarization, and we have a sort of difficulty to have contradiction. In philosophy, it's very important to have a dialectic opposition, a debate. But in France, we have no debate. We have one information by the (authorization) of information by physicians. I think that is very problematic for the non-development of fake news, because we have one access by a physician expert and we have no discussions, because it's the truth. It's a presentation like it is the official truth, and the problem is not the construction of a debate.

RÉMY (étudiants de Lyon Est): J'aurais peut-être voulu répondre quelque chose à chaud à M. Andrieu: I don't know if I will be able to talk to you in English, but I agree with the fact that there is not a very good discussion between the physicians and the population. But the problem is not only educating the population, it's also educating the physicians, because as we know, a lot of physicians are really illiterate in statistics. There is a lot of literature about the competence of physicians about the statistics, to understand the scientific papers and things like that. And we know that they are really bad at the exercise of bayesian inferences, for example. Des inférence bayésiennes, c'est-à-dire to really be able to do complex and even simple statistical texts. So how can physicians who don't really understand statistics explain to a population (basic) risk, and can understand how to communicate efficiently? Like being (able) of a paper about psychologists, Gerd Gigerenzer, (basic) results. We know that since two decades and we still talk with percentages, we are still not able to really communicate efficiently. It's a good thing to educate the population and to start a real debate, but we also have to understand that maybe our education of physicians is not good enough to be able to really create an (interesting) debate.

GUILLAUME LIO : I understand this point, and it's a problem, because we are no educational physicians in this crisis, because the physicians are all presented like the high level of information and science. And we have now a conflict between some physicians, because the problem of formation of these physicians appeared, but after the crisis, not in the crisis.
There is a lot of really good physicians who understand the scientific papers and statistics, but there is a really great disparity, there are people we really don't care at all about these (basic) things. So if the medical community is not on the same page everywhere, we can't really start a really good debate. Because we can say that the best people will be the ones to create debates. But there are still patients who will talk to their physicians, who will ask about some things, and if they are not competent enough, it will not work.

To understand statistics and to learn statistics, it is to accept the fact that there is not a one only truth. All depends on the context, it's not one truth. And the problem, I think, in France or the educational system, in fact is that we have to learn one true thing, some rules, some physical rules. The analysis is like this and not like this, and we have to do that and that, the evaluation at the end of the year, etc. In France, there is no culture of the doubt. And if you want to be good at school, you have to learn one rule each time, you see? Statistics are not well known. On apprend pas les statistiques au lycée. We don't learn statistics at school. So it's a problem.

And also, statistics is a domain, like medicine. It's very difficult to just learn statistics, even with years of training, it's still quite difficult to understand. So maybe working with statisticians or with people who are competent in this domain will help even physicians who don't really participate in the writing of scientific papers, just to educate them on the subject.

The concepts of statistics are not hard to understand. I think we can teach some basic rules of probability, density of probability for example, to cheat. That is not... C'est aléatoire. I don't think it's so difficult to teach to some basic stuff of statistics to a child. And I think it's important to have some critical advice of all what can happen in the world, to make, how do you say that, a weighted evaluation of all information that you can find everywhere, on the internet for example.

Thanks, Guillaume.

Maybe, Isabella, you want to do add something about the first topic? I don't know if you hear us, Isabella. Isabella Tomassi?

OK. Merci déjà pour l'invitation. Je suis ravie d'être là, c'est très intéressant. It's really interesting. Thank you a lot for all students and their work. Maybe I have a point of view a little bit different, because I'm working on catastrophes and emergencies. So this kind of questions are not really new in my thinking in my practice, in my experience, in my field work. Especially, the question of emergency communication is a big classic question in disaster studies. Disasters studies is not a discipline like in France, of course, it's more like the English or American type of study that puts the event in the center, like the object of research. And then many, many disciplines can have their point of view and something to say about. So in disaster studies, the problem of emergency is always central, because it is at that moment that we see if a society is prepared enough, if a society reflects enough on its uncertainties, on its risks, on its alea, hazards. All this kind of stuff are all different. For us, uncertainty, which is for me the situation of COVID, is very different from risk. And in this sense, for me, we cannot give so much importance to statistics in case of COVID, because to have solid statistics, we need a long time of research. In the case of COVID, we were more in uncertainty. That puts other kind of questions. When we are in front of the knowledge and the truth, which is our question in this moment, the truth that we have to communicate, so how to conceive once truth that is shed in a large community, a global community of scientists, how to do that this deep truth is passed by media, which is a medium, so it's something that filters and deviates and transforms the reality and the world. So I mean, I think this is a question that is, how can I say, really political. And so we see, because many, many states give different types of communication in case of COVID, for example, depending on their national politics. This is the truth. So maybe social science can give this point of view on medicine and physicians, maybe to come out from universalism and go more on their responsibility engagement in the public space.

Thank you, Isabella, for this interesting comment, and maybe (inaudible) into the second topic. Maybe there are also Nancy Midol, anthropologist at Nice and Véronique Mondain, doctor in Nice, if you want to make a short comment, go on, otherwise, you can make after also.

2. LE TRANSHUMANISME EST-IL INÉLUCTABLE ?

Taki Jade (Ottawa), Francis Demontigny (Ottawa), Maël Plemert (Lyon Est)

RÉSUMÉ : Le transhumanisme est un des enjeux de la médecine au XXIème siècle. Il correspond au projet d'augmenter ou d'améliorer l'homme sur les plans cognitif, physique voire émotionnel de manière consenti et informé. Les trois idées philosophiques desquelles il relève sont le passage de la dialectique normal/pathologique à ordinaire/augmenté, l'idée d'augmenter la longévité en bonne santé et la revendication d'un eugénisme naturel. Il se manifeste dans certaines innovations technologiques : les NBIC, la robotique, l'ingénierie tissulaire et génétique par exemple. Nous constatons d'ores et déjà en stages hospitaliers certaines applications tels que l'usage de l'ECMO en réanimation, la chirurgie de raccourcissement des cordes vocales ou encore la place de l'intelligence artificielle en médecine. Enfin nous avons pu discuté des enjeux éthiques, anthropologiques et psychologiques du transhumanisme en nous interrogeant sur le contexte sociétal où il peut se développer, la question de l'identité, le rapport au corps et à la nature de ces modifications par exemple.

PAERSONALIZATION AND IDENTIY

Commentaire par Bernard Andrieu, Guillaume Lio puis Isabella Tomassi.

BERNARD ANDRIEU : Thank you for your presentations. I think that it's very interesting by a general presentation of transhumanism, but I think it's so general, because I think perhaps you can think different concepts in transhumanism, with (brilliant) examples, with different status, like the cyborg, like hybrids, like robots, extension of the body, experience out of the body. And I think in my work about hybridation I made many different conceptual differences. And it's a hard work because you have very well exposed, in this example, the confusion about the term transhumanism. What is the difference between posthumanism and transhumanism? What is the difference between cyborg and robotisation? What is the difference between hybridation and the mix, the hybridation with natural part and artificial part? I think it's a very different situation. Gilbert Hottois and Luc Ferry, are very good philosophers, but I think we have many works like Donna Haraway, Bruno Latour and other philosophers, who can help you about these different concepts. And my second point is about your very good question, at the (end) of your exposition, about the problem of the change of identity, or the problem of body scheme revisited. And I think it's a very good solution to make a reflection, because the problem of identity is a very complex. If you change one part of my body, do you change my whole identity? And I think Stéphane Ferret wrote a very good book about the ship of Theseus, about this problem. And if you change all parts of the body, do you change all the logical identity, or the physical identity? I think we have many reflections in philosophy about the problem. What is the identity of the body? The name? The subjectivity? The material parts of the body? I think it's a very good question when you say, well, do we keep the body? Are we the body or do we have the body? My work about emersology, the relation between living body and livid body, I think that you have a good solution about the problem of a body scheme revisited, the problem of, well, the activation, insulating body of new capacity, and I think Rousseau used the term perfectibility, and the perfectibility is different from perfection. Perfectibility is like we can revisit Aristotle about the difference of potentia and actualization of this potentia. And I think the transhumanism is a new possibility of self health, of new activation of new possibilities of being. And the problem is, well, my actual body is not all possibilities of my body, because we have a scientific context, a cultural context, a representational context, like many limits of what is possible for my body. If I live like my grandfather after the (end) of the first war, we don't have a possibility to make a bionic prosthesis for his (limbs). He didn't have this possibility. The prosthesis were mechanical prosthesis in this period. And the problem is the adequacy between the progress of techniques and science and ethics, Luc Ferry, Gilbert Hottois, ethical consideration about the acceptation of this new possibility of development of the body.

RÉMY (étudiants Lyon Est) : Could I say something about that?
You say that, indeed, we have a lot of possibilities. The body I have now is not the only body I can have in all possible worlds, but a problem with transhumanism, I think, is we don't really define what perfection is, because we are perfectible, but what is the ideal body for transhumanism? And it's something we don't really see and we're not really sure what it may be. But that is a problem because, to talk about differences in the age of people, we say that nature is unjust, because we don't have the same potential, we don't have the same body. But what will be the ideal body that we should all tend to? And that is the problem, because if we are not able to define what an ideal body is, we are not able to say that nature is unjust, or that we are not equal or things like that. So it's kind of a problem as everyone has his own idea of an ideal body.

Thanks Remy for the comment. Maybe there is a... I don't know if you're hearing me.
Yes. Mehdi, do you hear, Mehdi? Yes.

The thing about transhumanism is that there is no perfect body. You have to improve it, even though you're born like with no disease or I don't know, anything that is not normal. There is no perfect body. You can improve it any way. Even though you're perfectly healthy, you can always improve something, like you can have a third eye, a third arm, or anything else. There is no point defining the perfect body, since you can always improve it.

But the problem with the concept of improvement, I think, is that it's not an improvement, it's not better. And if it's better, we can think about something that will be best body. And that's quite a of a problem.

JADE (Ottawa) : I just wanted to add a very interesting point, Remy and Mehdi, and actually one of the discussion points that we had, and unfortunately we had to skip over, was the idea of nobody has a definition of what perfection is. And every single person has a cultural background, a religious background, a social, psychological, so it becomes so complex to define what perfection is, what makes a person happy when a person can say: «OK, I don't need artificial intelligence any more, I have hit the maximum of how I can improve.» So the debate basically showed that there's no perfect answer. And the idea that there will, from one side, like Mehdi said, and that was actually one of the points argued by one of my colleagues, the concept of there's always going to be something to improve, you know, depending on how you look at it. Without being too philosophical here, but sometimes we have to see perfection beyond the imperfections. So I think there has to come a time where the human species needs to be comfortable with themselves and say: «OK, I've used artificial intelligence, but I'm happy the way I am now.» So it's definitely a very interesting topic, and really, there's so many different perspectives on how we can look at it.

Thanks Jade.
Maybe Guillaume or Isabella, you want to make your comments?

GUILLAUME LIO : Yes, just a little point. Yes, there is not an ideal body. For you, an ideal body can be very different than for another guy, for example. And what is interesting is for a certain point of view, a certain context, an ideal body, an ideal prosthetics for example, can be perfect for the world where you are living now, but tomorrow it can be different. So you have to change, and you have to change all the time. It's more or less, I think, an important point on transhumanism. And some people don't want to change, so it's important to be conscious of that. It's part of freedom, too.

Isabella? Thanks, Guillaume.

Yes. I want to point out to a certain coming out from this really interesting ontological discussion and go more into the term of innovation, that is related to transhumanism. For me, this is really dangerous as well, because when we talk about innovation, we talk about the industry. So we talk about the possibility of commercializing and selling this kind of technology. We are talking like this kind of discourse is a discourse of philosophers. The discourse of someone who doesn't have any interest. But in fact, this kind of reflection on transhumanism is brought by people who have many financial interests. So for me, it is in there, we are not really free on this discourse. We are not really free to think because for me, there is a bias -c'est biaisé- (it is biased) by this kind of oppression, the interest some people have, a commercial interest, in this technology. I mean, I fear that we will do as in an always progressing society, that has this ideal of progress, that we try to do anyway. We don't know where we are going, but we go. We go forward and forward and forward, and we will see then. And then, it may be too late to come back. We will do many... I don't know. It is about ethical, of course, but for me, it's more commercial as well. Thanks Isabella for this comment.

3. INTERFACES ET RELATIONS SOIGNANTS/ SOIGNÉS

INTERFACES ET PATIENT INTERACTIONS

Barbara DUPLAIX (Lyon Est), Jake RANOT Jake (Ottawa), Raphaël Lescar (Lyon Est).

Interfaces et relations patients : responsabilité et erreurs.

RÉSUMÉ : L'essor progressif de nouvelles technologies, guidés par l'intelligence artificielle est un défi nouveau pour les équipes médicales. Les robots sont utilisés comme companions pour des personnes âgées, comme outils d'aide à la décision, ou encore comme aide durant les opérations chirurgicales. Cependant la tendance des développeurs à diminuer les différences entre les robots et les humains a amené de nouvelles problématiques. En ajoutant aux robots, des émotions, une réflexion et un comportement humain, ils participent au mélange des rôles. Notre objectif est de nous plonger dans la manière dont l'équipe médicale réagit face à l'émergence de ces nouvelles technologies. Cet article questionnera la manière dont l'utilisation de l'intelligence artificielle a remodelé la question de la responsabilité médicale. Il se penchera aussi sur l'évolution de l'image que les soignants ont de leur propre rôle. Les étudiants se sont appuyés sur des études publiées ainsi que sur les témoignages de professionnels de santé.

Commentaire par Didier Vinot, Isabella Tommasi et Francis Backewell : Voir commentaire de la table ronde 4.

4. USAGES DE L'IA DANS LE CHAMP DE LA GÉRIATRIE

Estela Castillon (Lyon Est), Rahul Kapur (Ottawa),
Margot Berne (Lyon Est),
Radamis Barroso & Pauline Jannon (Tuteurs, Lyon Est).

INSCREASE IN SHARING

RÉSUMÉ : L'intelligence artificielle est l'étude de production de machines qui ont les mêmes qualités que l'esprit humain : comprendre un langage, reconnaitre des images, résoudre des problèmes, apprendre… réalisés d'une manière similaire à un humain. Dans ce cas, comment l'Intelligence Artificielle peut être utilisée dans les soins aux séniors pour répondre à leurs besoins sociaux, de santé, et leur vie quotidienne ?

Commentaire des présentations 3 et 4 par Didier Vinot, Isabella Tommassi et Francis Barckewell :

Yes, thanks a lot. Thanks. I think I will make my comments in French because I would like to be precise in what I would like to say, even if I think that I understood what you did concerning these two very interesting presentations concerning interfaces and patient relations, and their vulnerabilities (and) their (inaudible) fields. OK. So a few comments, but it's not criticism. It's some observations to try to understand how we could see the problem in another way. OK? Je pense que les deux présentations telles qu'elles ont été faites sont vraiment intéressantes et montrent comment l'apport des sciences humaines et sociales permet d'enrichir une vision médicale. Et c'était un peu l'objectif qu'on recherchait dans cette université d'été et je trouve que rien que pour ça, l'exercice est vraiment réussi.

Je voudrais partir de quelque chose qui n'a peut-être pas été suffisamment évoqué me semble-t-il : c'est l'effet Covid. Jusqu'à présent, l'intelligence artificielle, notamment du point de vue des usagers, du point de vue des médecins utilisateurs ou des patients, cette intelligence artificielle était perçue jusqu'à présent avec beaucoup de méfiance, beaucoup de prudence. Il y avait d'un côté les concepteurs, ceux qui se lancent dans l'aventure et qui sont dans un discours 100 % positif. Et puis il y avait les utilisateurs, professionnels de santé et patients qui eux regardaient ça de manière beaucoup plus prudente. Bon. Ce qu'il faut constater avec l'effet Covid et la pandémie que nous vivons au niveau mondial depuis trois mois, c'est que ça a accéléré les usages parce qu'on n'avait pas le choix. La télémédecine qui est évoquée dans la présentation, d'une manière ou d'une autre, c'est quelque chose qui existe depuis une vingtaine d'années. Mais vous voyez que ce qui est intéressant – et ça les sciences sociales peuvent y apporter quelque chose d'utile – c'est qu'il ne suffit pas qu'une technique existe pour qu'elle soit généralisée à l'ensemble d'une population. Des sociologues, notamment dans le domaine des technologies, ont très bien montré qu'il y a des facteurs externes ou internes qui vont faire qu'il va y avoir une accélération d'une appropriation de ces technologies. Donc, gardons bien en tête que finalement les techniques qui ont été utilisées dans le cadre de la pandémie – je me situe bien dans ce contexte là – sont des techniques qui existent depuis 20 ans. Donc, ce n'est pas révolutionnaire. Ce qui est révolutionnaire, c'est la généralisation et la vitesse d'appropriation. Si on prend la deuxième présentation dans le domaine de la gériatrie, ce que vous avez dit est tout à fait exact. On en connait l'utilité par rapport à l'aide sur les différents besoins qui ont été identifiés. Je ne vais pas revenir dessus. Mais ce qui est surprenant, c'est la manière avec laquelle les centres d'accueil des personnes âgées, dans un premier temps – je pense à des maisons de retraite – étaient dans une forme de déni, d'incapacité à répondre, pris de court comme un grand nombre d'entre nous dans nos secteurs professionnels. Et puis il y a eu des capacités d'adaptation extrêmement rapides. Qui aurait imaginé il y a encore deux ou trois mois la généralisation des tablettes auprès des personnes âgées nonagénaires, voire quasi centenaires dont on imaginait que, finalement, c'était tellement loin de leur univers qu'il n'en était pas question. Eventuellement, on parlait des robots accompagnateurs – ce genre de choses, vous en avez fait mention. Mais aujourd'hui, on ne peut pas imaginer une maison d'accueil pour personnes âgées sans qu'il puisse y avoir des connexions avec les familles éloignées sur des tablettes. C'est à dire qu'il y a quelque chose de nouveau qui est apparu et moi je pense qu'on n'a pas encore suffisamment théorisé cet aspect-là.

C'est que cette pandémie a permis une accélération des nouveaux usages mais elle a surtout fait en sorte que maintenant il y a des besoins qui ne seront plus (négociables). C'est-à-dire que je ne vois pas comment à partir du mois de septembre ou d'octobre, pour faciliter la relation entre des parents et des enfants, qui vont avoir 90 et 70 ans, on va dire : «Maintenant, c'est impossible. Vous ne pouvez pas vous déplacer. Vous-même vous avez 70 ans, vous avez des difficultés à vous déplacer.» On sait que ça pose des problèmes, que les enfants eux-mêmes, pour certaines catégories, ont des problèmes de mobilité à leur tour. Autrement dit, les effets positifs que je vois dans cette usage de l'intelligence artificielle sont beaucoup plus dans une réappropriation par les professionnels et les patients-utilisateurs et non pas concepteurs. Parce que comme on devient de plus en plus nombreux à l'utiliser, on ne maitrise pas complètement, donc on devient critique, on va pousser aussi à une amélioration. Et je crois que ce qui peut nous sauver et nous préserver par rapport à notamment ce qui a pu être dit dans la première intervention, c'est que l'intelligence artificielle n'est pas complètement intelligente, elle va y venir. On peut maîtriser encore un certain type de choses. Je vais y venir. Moi, ce que je constate, c'est que par rapport à ce que nous avons observé – et vos deux présentations le confirme – c'est que dans le domaine de la santé, en économie de la santé, on avait une loi universelle qui était présente globalement depuis que l'économie de la santé existe, c'est-à-dire une cinquantaine d'années. Cette loi universelle est la suivante : on dit que dans le domaine de la santé, la demande est induite par l'offre.

C'est-à-dire, tant qu'on n'a pas de capacité technique pour soigner quelqu'un, pour l'accompagner, une personne qui est malade peut toujours dire : « J'aimerais bien que vous me guérissiez», mais la réponse traditionnelle dans les systèmes de santé consistait à dire : «Oui, mais on ne sait pas faire». Bon. C'est ce qu'on appelle une loi de demande induite. Et ce que cette loi de demande induite montrait, c'est que même si après on venait à diminuer l'offre de soin, la demande reste stabilisée à un haut niveau. Et je pense que c'est ce qui va s'appliquer ici. Que cette loi est toujours valable. L'effet pandémie a créé de nouvelles craintes par rapport à l'intelligence artificielle, mais aussi de nouveaux espoirs qu'on n'avait pas imaginés. Pour le dire autrement : de nouveaux usages. Et qu'à partir de là, il ne va pas y avoir de retour en arrière par rapport à une demande de la part des professionnels utilisateurs et des usagers. Donc, ça peut contribuer à une accélération, mais aussi à un danger qui va être un renfort de la fascination de la technologie. Or, vous avez bien montré dans vos deux présentations que l'intelligence artificielle ne répond pas à tout. Bien sûr, on le sait. Donc, autrement dit, il va falloir qu'on apprenne à dompter cette fascination nouvelle qui est apparue. Ce que vous avez montré dans les deux présentations de manière transversale, qui me semblait très nette, c'est le problème de la qualité de la relation qui n'est pas réglé par l'intelligence artificielle aussi bien dans la question des responsabilités – qui ont été évoqués – et des erreurs que dans la question de la vulnérabilité des personnes âgées. L'intelligence artificielle permet la relation, elle permet de l'échange de données, elle permet des systèmes experts dans l'aide à la décision. Mais vous avez illustré dans ces deux cas précis qu'elle ne joue pas sur la qualité relationnelle. Elle peut aider. On l'a vu là aussi dans des problèmes de débit ou de son. Elle peut aider à la favoriser ou à l'empiéter. Mais ce n'est pas ce qui va faire que la qualité de la relation entre un professionnel et un patient va être amélioré. Et donc, ça reste une grande inconnue pour ça. Et je trouve que du coup, c'est aussi un élément extrêmement important pour les professionnels de santé. Classiquement, on sait que les médecins dans un grand nombre de domaines – pas tous – adorent l'aide de la technique pour prendre la décision la plus optimale dans l'intérêt de leurs patients. Et parfois la discussion, l'élaboration peut venir en second, dans un deuxième temps, quand en gros on sait ce qui est bon. Or, là, imaginons que l'intelligence artificielle prenne la part du cerveau médical, qui fonctionne en arbre de décision et qui permet de choisir la décision la plus rationnelle qui soit en fonction de l'état de l'art médical.

On y est presque. Imaginons que l'intelligence artificielle puisse faire ça. Mais ça ne va pas remplacer la manière avec laquelle un professionnel de santé va effectivement pouvoir convaincre, expliquer, être dans – j'y reviens – une qualité relationnelle avec un patient. Ce qui veut dire qu'il y a tout un champ à réinvestir pour les professionnels de santé dans ce domaine. Mais je pense avoir parlé à des convaincus sur ce sujet-là. Maintenant, je n'avais pas pensé à quelque chose en vous écoutant, je n'avais pas pensé réactiver mes connaissances de droit médical. Or, quand vous avez parlé de la responsabilité de la décision, vous ne pouvez pas évacuer ce sujet-là – donc c'est une remarque plutôt focalisée sur la première présentation que je vais faire. Vous ne pouvez pas évacuer la question du droit médical quand vous traitez de la question de la décision et de la responsabilité. La responsabilité est d'abord une notion juridique. Or, quand le médecin est pleinement responsable, quand il prend pleinement sa décision, ce n'est pas difficile : il y a un problème, c'est lui le responsable. C'est pour ça, d'ailleurs, qu'on dit que c'est un professionnel. Parce qu'il a plus de responsabilité que quelqu'un qui a un métier normal, quel que soit d'ailleurs les rapports hiérarchiques qu'il peut y avoir avec son administration. OK. Donc, jusque là, pas trop de problèmes. Là où ça se complique et vous l'avez très bien montré dans votre présentation, c'est quand effectivement la décision va être préconditionnée par l'intelligence artificielle. Mais il y a un autre point que vous n'avez pas évoqué, qui me semble tout aussi important, ce sont les décisions partagés à plusieurs. Vous aviez fait ressortir trois acteurs clés : l'industriel-manufacturer, les docteurs, puis les programmes. Vous pouvez introduire un quatrième : le patient. Et à partir de là, imaginez une responsabilité partagée dans la cadre d'un consortium, dans le cadre d'un contrat particulier qui pourrait être passé. Qu'est-ce qu'il peut se passer ? Le droit a donné une réponse assez simple. Il y a ce familier arrêt Mercier du début des année trente, donc c'était il y a 90 ans. En France, en tout cas,on a considéré de manière totalement artificielle que la relation entre un médecin et un patient était de nature contractuelle. Pourquoi ? Parce qu'il le fallait. C'était la seule solution qu'on avait trouvé il y a 90 ans pour résoudre un litige en cas de désaccord. Mais ce n'était pas quelque chose d'acquis.

Et ce petit effet de jurisprudence – qui n'a jamais été écrit dans une loi hospitalière ou dans une loi santé – le fait de considérer la relation entre un médecin et un patient comme étant un contrat – qui a été un pur outil opportuniste – après a été généralisé. Mais vous voyez bien qu'ici, si vous limitez cette question de la relation au champ contractuel – ce qui est un petit peu le propos du discours dans la présentation – eh bien, vous tombez dans des impasses qui ont été bien soulignés. C'est-à-dire qu'on en arriverait à condamner un programme d'intelligence artificielle qui aurait pris une mauvaise décision. Et ça, je ne sais pas si vous avez fait un petit peu de droit dans le passé, mais cela correspond, pour le cas de la France, au droit de l'ancien régime où on pouvait condamner des objets, des animaux. On pouvait condamner un chien parce qu'il avait mordu quelqu'un. Vous voyez que dans le droit contemporain en France en tout cas, c'est quelque chose qui n'est pas possible. Pourquoi ? Parce que cette notion de responsabilité qui est centrale, que vous avez mise en évidence dans votre présentation, elle est étroitement liée à la notion de volonté et de raison. On ne peut, en France, condamner que les êtres raisonnables. Donc la question qui est posée par rapport à l'intelligence artificielle, c'est : Peut-on considérer qu'une intelligence artificielle soit suffisamment raisonnable ? Ou pour le dire autrement : ait une raison autonome qui fait que finalement, elle n'aurait pas de compte à rendre, ou elle n'aurait de comptes à rendre à personne. Donc ça, c'est le premier point. C'est le problème de la raison. Peut-on dire que l'intelligence artificielle est raisonnable. Le deuxième point qui va être extrêmement important dans un jugement, d'un point de vue juridique, c'est la volonté, c'est l'intention. Est-ce qu'il y a eu intention de nuire ou pas ? Est-ce qu'on a nui à son patient, mais on a tout fait pour essayer de le soigner en fonction de ce qu'on connaissait de lui, et de l'état de l'art médical. Donc pour le juge, la raison et l'intention vont être deux notions absolument centrales pour déterminer la responsabilité d'un individu, d'un groupe social, ou d'une (institution). Vous voyez que si vous retenez ces deux critères : volonté, intention d'une part, et d'autre part raison, on est encore très loin d'une forme d'autonomie dans les systèmes d'intelligence artificielle tels qu'ils sont proposés aujourd'hui.

Bien. Et puis un dernier point, c'est qu'autour de ça, qu'on va retrouver aussi dans la deuxième présentation, c'est que si les robots sont capables de détecter des émotions des humains, eux, jusqu'à nouvel ordre, ne font pas preuve d'émotions. Alors, ça commence un petit peu. Il y a quelques éléments. Il y a quelques tentatives. Ce qui fait que finalement il peut y avoir responsabilité de la part des professionnels, c'est que ces professionnels qui font l'usage de la raison, ils ont aussi des sentiments, ils peuvent souffrir, ils peuvent avoir peur. Un médecin peut avoir peur. Ils peuvent avoir de la culpabilité, ils peuvent aussi avoir de la (cupidité), de l'empathie, bref. Tout ceci, c'est quelque chose qui est extrêmement important par rapport au comportement humain et qui envoie à l'imprévisibilité. Le problème de la raison, et de la volonté, c'est que d'un certaine manière, elles sont prévisibles par rapport à des critères que nous utilisons en économie et qu'on qualifie de maximisation d'utilité. C'est-à-dire qu'en gros, en économie, et plus particulièrement en économie de la santé, on se dit : « La personne n'est pas bête, elle va agir en fonction de son intérêt». Il suffit de comprendre son intérêt, de lui demander éventuellement, et puis en fonction de ça, eh bien, soit on est d'accord, soit on n'est pas d'accord. Sauf qu'un être humain n'agit pas toujours uniquement en fonction de son intérêt. Ça se saurait bien, vous les professionnels de santé, sinon plus personne ne fumerait, ou ne boirait d'alcool. Tout le monde sait aujourd'hui que fumer, c'est mauvais pour la santé, donc quand on fume, on fume contre notre intérêt. Donc, ça veut bien dire que nous sommes (guidés). Ce qui nous caractérise comme être humain, ce ne sont pas que les critères raisonnables, ce ne sont pas que la volonté, ce sont aussi tous ces registres qui vont expliquer notre comportement, à partir de critères qui sont de nature plus psychologique. Et l'intelligence artificielle ne pas le résoudre (inaudible) situer spécifiquement à ça. Alors, pour terminer, puisque vous m'avez donné la parole (inaudible).

Je voulais quand même terminer avec un dernier point. Très important, qu'on n'a pas évoqué à aucun moment et qui me semble très important. C'est la problématique de la collecte des données aussi bien dans le premier exposé que dans le deuxième exposé. Et du statut privé ou public de ces données. Vous ne pouvez pas travailler la question de la sécurité, la «safety», la sécurité qui avait été évoquée, si à côté de cela vous ne travaillez pas la problématique de l'accès aux données.

Et j'ai trouvé que c'était absent dans les propos. Or, c'est quelque chose d'absolument fondamental, parce que vous savez très bien que ces données de santé peuvent être marchandisés, peuvent être réutilisés, mais même les données, en général, des individus – je vous rappelle que Facebook aujourd'hui, simplement dans la collecte des données qu'il peut avoir, de ce que vous donnez volontairement, Facebook peut orienter le comportement des individus en contrôlant le nombre de suivi des images ou des posts qui ont été faits, et nous savons qu'il a joué un rôle majeur dans les élections présidentielles américaines il y a trois ans. Donc, vous ne pouvez pas évacuer cette question-là et ne regarder le sujet que sous l'angle technique. Il faut aussi le regarder sous l'angle de la propriété. Et puis dernier point, un petit rapport d'étonnement. Les deux présentations ont été faites d'une manière scientifique bien classique avec : Quel et le contexte, après, le problème à résoudre, les solutions et les prolongements. Ça, c'est vachement bien. Mais moi je pense que pour les prochaines années, il faudra que nous cientifiques, quels que soient nos disciplines, nous passions du problem-solving or project-building. Et là, il y a quelque chose à faire autour de, notamment, l'intelligence artificielle, qui ne sera pas simplement là pour nous aider à résoudre des problèmes, mais elle doit être là pour nous aider à bâtir des projets partagés. Voilà. Je vous remercie.

Merci beaucoup.
Thank you so much, Didier.

Isabella Tommassi: I always try. Yes. I will be shorter than Monsieur Vinot. Merci beaucoup. It was really interesting. And you have (mentioned) some points that I want to touch on in my commentary. So, thank you very much. I will be shorter. So, of course, yes, I was really touched by the general position of the two presentations about the acceptance of AI as if it was a fact. This is why it is shocking to me in this (inaudible) (Covid) because before we tried to have a social discussion about artificial intelligence, and 5G, and those technologies that will impact our daily life, (but) now – just as Mr. Vinot said – this discussion has (been accepted) (because of) the emergency, the crisis. And this is typical, of course, of disasters. Disasters are always modernity accelerators. Usually in the urban field. For example, in many cases that I have studied, we see social engineering, so we (evacuate) poor populations. It was a process that was ongoing, but a crisis, or a disaster, will help public policies accelerate some of these processes. So, it can be social engineering, or it can be, for example, to evacuate a (block) to build some buildings or try to use other technologies. Anyways, in modernity, progress and faith in technology is something that maybe we really have to rethink. In my opinion, of course, we should (use) more distance to be able to have real rational reflections and understand as well. In the case of (AI) technologies supplied for telemedicine, or seniors, I see that we don't have this distance that is skepticism. You know, «être assez sceptique» means bringing this distance to have a good view of the situation before acting in an emergency way of solving problems. Of course, I agree with Mr. Vinot's proposition a lot, though I think about bringing collaborative and more standard processes and projects instead of reasoning on solving problems in a crisis. That makes our vision thicker, and most of the times, we give this deliberation choice, freedom, to one man, one team of experts that, in that time, have the power of knowledge. In this case, the power of knowledge is in the hands of the medical staff, especially the physicians and doctors. So, we cannot overthink an entire society, in my opinion, just because in this specific time, we live this (a phenomenal) pandemic, and this specific pandemic. And maybe tomorrow this kind of technology will not be adequate. So, coming back to the presentations, it was really interesting. Thank you again. For the first one, I want to point out that for me, there is a lack of politicization of AI, again, because that we can't just bring a (type of) technology of this amplitude (as a fact). It will change our relationship to our identity – I already said that yesterday. It will change our rights, public rights, it will change public property rights, it will change the health structures and organization. I mean, it is so big to just (evacuate) some questions. And for the second one, I'm (wonder) if it's something that I want to share with you to grow together in this collective discussion about why we should spend so much time and money, and intelligence, and time, and students, and energy resources to (teach) a machine what we are already able to do. We are human. Why do we have to humanize robots? I don't understand this. It's a real question for me. Why do we have to humanize an object? We are humans, so maybe we just are to be more human.

So maybe the question about the isolation of older people is a concern in our society. And we cannot just erase this like (inaudible), say, for example, gentrification and urban studies. We cannot just evacuate social problems by proposing technical solutions. And for me, it is more about (that). So, it's not just (inaudible) for you, but really, I want to be with you in the questioning. And for me, just a point. Proposing AI as a solution without this reflection, we impose on ourselves to switch... To me, the danger is to switch from a paradigm of prevention to a paradigm of resilience and (inaudible). As we accept to live in a world that is always subject to this type of (crisis). And this is not suitable for me. I can't agree with this kind of paradigm because it is too heavy in consequences, and we are already seeing catastrophic (situations). If you are interested in that, I can give you a little more literature. But thank you very much because the drawings were really nice, and really added to humanize the discourse. Thank you.

Thanks very much, Isabella.

FRANCIS BACKEWELL : Yes, thank you to everyone. Thank you to the students for a great presentation and Didier and Isabella for their insight. I will remark on the first presentation. One thing that struck me the most was this conversation around liability and responsibility for errors or for harm happening. And I think what I find the most fascinating about this is that – at least in our medical-legal system – it's not the simple fact that harm has happened that says that there is some liability. The thing that gets evaluated from a legal perspective is what was the thought process that led to that harm. So, errors can happen, and deaths can happen, and bad things can happen, but as long as there was a justifiable and reasonable process, then usually no liability is found. So, a doctor will not be found with malpractice if they made a reasonable decision, even if something bad happened. And so, the fascinating thing, obviously now with AI, is we won't necessarily know why decisions were made, and we won't be able to go back and evaluate whether they were reasonable. And so, I find it interesting. I don't think it's going to just be a matter of: Are we shifting liability from doctors and companies and moving it towards AI? I think overall, we're going to see less liability. (Sometimes) we are just going to say that, by definition, what happened was within the standard of care, and AI is such a black box that it will be difficult for us to evaluate the reasons. And that's extremely unsatisfying for patients, obviously. I think we are going to see that they will have less recourse and less availability of legal ways to complain or to bring up their concerns. I really appreciated the point that you made about shared decision-making and including patients in these discussions, and to do what AI is suggesting we do is a decision itself. And obviously, we will need to include patients in that decision. And I hope that there would always be the option of agreeing between the patient and their physician to do something else, not to follow what the algorithm says or not to do what artificial intelligence says. And we use a lot of algorithms in medicine already and that option is still present. I think the quote that was given about radiologists not wanting to disagree with AI is a very important point to consider, though. And I think that increasingly we're going to see physicians trying to persuade patients not to disagree with AI. And likewise, I think we're going to see patients, even if they want to share the decision, feeling powerless to disagree, and feeling like they don't have a good reason to disagree with AI, except for a gut feeling or an emotion. And so again, I worry that we will have the illusion of shared decision making when in fact it will not really be a decision, it will be a decision to allow someone or something else to make the decision. And then regarding the second presentation, and I appreciate Isabella's comments: the caution about accelerating technologies because of a crisis. And I think my biggest concern with AI and our geriatric population is, as Isabella says: «Why do we have this need to adapt, to humanize these technologies?» I will be very cynical, and I'll say that in this particular instance of AI and geriatric, I think it is almost entirely going to be about costs. I don't think it's that we are giving better care to geriatric populations with these technologies, but we are certainly going to be getting cheaper care if we can pull helpers and clinical people out of homes and add programs providing all that care. And in Canada, at least during COVID, we saw that so far, the biggest tragedies have been in long-term care homes. That is where most of our deaths have taken place. I think it's quite similar in France, I understand. And for us, it is because a lot of our homes are overcrowded and underfunded. We are always trying to push people to stay in their homes to try and prevent things like that, to prevent contagious illness. And patients often want to stay in their homes. What I fear is that they are going to be given a false choice and we are going to say: «Well, if you want to stay in your home, the only way to do it is by using these technologies, and if you don't want that, you'll have to go to a home». And that's going to be a false choice. So, there will no longer be the option to stay at home without artificial intelligence.

And we already have that same problem, which is you can stay at home, but there are some very serious restrictions that you are given in terms of who comes in to help you, what kind of support, whether you can choose, who's coming in, what kind of meals they're going to give you, so a very limited choice. But we tell ourselves: «Oh, they have the choice of home or a resident, a long-term care home», and often it's a false choice. And I think that's going to get worse – I fear – with artificial intelligence.

Thank you very much, Francis. Kristina, do you have any comments?

KRISTINA LAPERLE : Toutes mes excuses, I don't feel I'm an expert in the field, so I will say (it was) a very interesting dialogue, it is certainly making me think about a lot of things. I have two elderly parents who are starting to need care, and so, I think the discussion and the debate... And I think what Isabella said about the question: «Why do we need it?» And certainly, Francis' answer, Dr. Bakewell's answer about the costs. And I think about my parents and the choices that need to be made. I have to agree with them both. And it's a question for the patients. It's a question for the caregivers. But it's also a question for society at large in terms of... The olden days, the elderly would be cared for by the families at home. But as we've seen in COVID, there are lots of other challenges when you have extra dependents at home that are not children, not in school, and elderly. It's a very complex issue. It's some wonderful points to consider from both of our guests with relation to telemedicine and AI, and how that's going to change, I think, life in general.

DISCUSSION AVEC LES ÉTUDIANTS :

Jake, Raphael? Rahul?
Yes, of course.

One of the ideas that I had read about was... because using artificial intelligence will possibly increase the quality of a patient's care, allow them to be treated faster. For that reason... Oh, combined with another idea that every time artificial intelligence sees a patient, it learns from that experience. So, one professor was talking of the idea of treating that as labor, that patients should be paid for those experiences because they're helping to train the AI. So, if you imagine the world where the patient is getting remunerated for accepting treatment with AI because they're helping to train it, as well as the fact that they'd be seen faster in (emergency) because of the AI, possibly more accurate care. But for all those reasons, to accept the care of AI, they would have to give up their right to sue for any mistakes, for any malpractice. And that would be part of that consent because it's such a (black box) and it's so complicated to figure out who would be at fault in the case (inaudible) that one idea would just be to give up any liability on any party. I thought that related to what Dr. Bakewell was saying about how using AI may be the standard of care, and because we don't understand the inner workings of how it is, you wouldn't be able to argue for any malpractice.

Thank you.

I just want to comment to (follow up on) yesterday's session. Yesterday's session, there was the notion of educating the (older) professionals, patients to use all these technologies and media, and the course resonates with me. Maybe it is a good source of inspiration for next year. From the first talk by Didier, about how to go about not solving problems but building projects, and from the second talk by Isabella: «Why do humans need robots?», I think behind these questions, we come back to the debate we had, which is: «How to educate people, how to train ourselves, to deal with this technology?». Just a remark (to follow up) because yesterday it was quite (inaudible). I don't know if there are any other remarks or questions.

Just one question. I do have a question for the last group. It is just something I wonder about, but aren't you guys afraid of (deviance) that can happen with all the technologies, and that can grow with the care of geriatric populations? Like, I'm thinking about (sedentary lifestyle) or obesity, all these kinds of problems that can happen way before the geriatric age. All these people might want to have those technologies and want to get benefits from them. What do you guys think about this?
Sorry, I missed the beginning part of your question, what did you say? How do they think about what?

Aren't you guys afraid of (dependencies) that can happen with technologies like the one you presented? For example, I'm thinking of people who might be (under the age of) geriatric populations who have an (issue) of obesity or some kind of problems like that. I feel that you want to stay at home. (inaudible) those (deviancies) that can promote this kind of behavior.

Actually, what we were talking about is that we don't see this technology (as being) exclusively for geriatrics. Of course, (inaudible) because our team was geriatrics, but it is something that we can use for the whole population.
Yes, but my point is: Aren't you afraid that the offer of these kinds of technologies might (drive) people to become sedentary or (to suffer from) obesity, or these kinds of problems?
Because we (find it easier than) old people, so young people...
Why (inaudible) younger?

Yes. Because it's something complicated. For example, we could use this same idea for the treatment of cancer, or lung cancer, for example. We're getting better and better with it. So, people would say: «OK, I can smoke because I know I'm going to get treated», but this (inaudible). There is no end to this because the moment we have a solution, people will say: «I can go bad because I have an escape door to go in case...» So, it is a concern. I don't think it prevents the good points that come with its use. Of course, I don't know if it was their (inaudible) in our (conclusion) – but we, in the geriatric field, don't see AI technology as a substitute for human contact. It can be used and can be good as an accessory because we see that we have a problem: we cannot take care of the elderly population the way we should. So, it could be used as an accessory to help the doctors to take care of them, but it cannot (substitute it). For example, (inaudible), it can be good to have a component that (inaudible) their needs, maintaining and activate their minds, but it cannot be their only social contact. (inaudible) for them to (inaudible). And another comment – that (inaudible) but it concerns the other group – is it (normally) (inaudible) the liability of robots or the liability of the technology. If you're talking about having a liability, to put a liability in technology, we are giving them a liability. And nowadays, this is something that we keep (hearing). So, if you can put a liability in technology, we can also give them rights, and it (will keep going) forward. And linking with the presentation of yesterday on transhumanism, (the real) question is: When we put a machine in our body when do we stop being human and start becoming more machine (inaudible). If you go the other way around, if you start giving rights and start humanizing the machine, where does it stop being a machine, and start becoming human? So (inaudible).

We have a lot to discuss next summer school.

Just jumping off what (Radamis) was saying, I think, also, approaching it through a needs-based approach: only giving... Or starting to use the AI mainly with people who need it for the conditions that need to be taken care of rather than just administering it to everyone. So then, it's not being administered to everyone. There are other problems that are caused by that, and then that links to what everyone else was saying about whether we should be humanizing this technology, to begin with, and also talking about how it may only address a cost-saving approach rather than improving standards of care itself. So, we may only use it to help decrease costs and administer it to people who are willing, rather than giving it to everyone and seeing whether or not it's being accepted in the population. Only using it for people who are accepting it.

Thank you.

OK. I think I (want to) go back to the very nice comment by Dr. Bakewell Francis, who talks about the illusion of decision making with AI, and one more time, I think it's a very good link to this question of the place of the power of AI. And also, what Didier Vinot said with the fascination (brought by) this technology, and we all (place ourselves) in front of it. Illusion, fascination, and overreacting, (we put ourselves in). And one more time, I bring to the place the word «education». We (reaching the end).

Do we have any more questions? I think we did a good job altogether. Thank you very much to all the students, the tutors, the teachers around the teams. And the work is not finished. Now, we'll have to work on all your presentations to make a summary to have a record, a souvenir, of our very strange summer school, but very fruitful – I think. Really, we (managed to do) it with a lot of stress – I should say – but we did it and I really want to thank all of you for the work you did, the help you provided. And I hope we could make something interesting for other people about the (inaudible) summer school. And I also want to give (inaudible) (to go through) with this summer school.

5. L'INTELLIGENCE ARTIFICIELLE EN MÉDECINE : CATALYSEUR OU REMÈDE DES DISPARITÉS SOCIALES

Oliver Fung, Océane Laboureau, Shabana Jamani, Francis Bakewell

Le virus COVID-19 provoque des maladies respiratoires, entre autres complications, et sa propagation est devenue une pandémie mondiale en 2020. Cependant, ses effets s'étendent au-delà des limites de la santé physique, car les implications sociales ont montré des effets disproportionnés sur les personnes de statut socio-économique inférieur. À Toronto, au Canada, des études ont montré que les régions où la prévalence des cas de COVID-19 était plus élevée ont été corrélées à plusieurs facteurs socio-économiques, notamment les professions, la démographie ethnique, les environnements de logement et la disponibilité des ressources de santé. De même, en France, des rapports ont montré des impacts plus importants du COVID-19 dans les banlieues ouvrières, chez les immigrés et les sans-abris.

VULERABILITY AND TECHNOLOGY

Ces dernières années, les progrès de la technologie médicale et les innovations ont permis à l'intelligence artificielle (IA) de jouer un rôle dans de nombreuses applications de la vie quotidienne. Cependant, l'utilisation de l'IA en médecine et son impact sur les disparités sociales et les inégalités en matière de santé restent contestés. L'IA a le potentiel de réduire et de corriger ces disparités et inégalités en augmentant la portée des ressources médicales vers des zones ou des populations moins accessibles, et en réduisant les préjugés humains dans la gestion médicale. Cependant, l'IA peut également être un catalyseur et un moteur des inégalités en raison de données biaisées utilisées et de la manière dont les humains choisissent de mettre en œuvre la technologie.

Ce rapport analyse des exemples de façons dont l'IA peut servir de catalyseur et / ou de facteur réducteur des disparités sociales et des inégalités en matière de santé. Grâce à une revue de la littérature et à des entretiens avec des experts dans le domaine de l'IA, ce rapport traite de la manière dont l'IA peut être mise en œuvre pendant la pandémie COVID-19 de façon socialement responsable.

ISABELLA TOMMASSI: So about the social environment. Thank you very much, Marceau. In fact, it is the paper that goes more in my field, for many reasons. First of all, because you use a lot of maps, and as a geographer, even if I am a philosopher first, I have a critic. Please don't don't feel like you're hurt by my critics. But I mean, in geography, we are really careful using maps in these days, especially the GSI maps, the GSI technique, you know, with the statistics that create maps that spatialize some data, because we have the tendency in this society of information, to give too much importance to the visualization and to images. And we risk, of course, to have to shortcut our thinking. We have false evidences, but when we do research with time, behind these prejudices or first intuitions, we see that these trust evidences are not so evident, in fact. So for example, I just go close. I mean, everybody remembers the hurricane Katrina, right? 2005. The media and most people said that the poor quarters were the most touched by the hurricane. Right? So we showed many maps to see that. But in fact, we see that it was not so easy to say, if people more vulnerable -so I'd like to introduce this concept of vulnerability-, are more touched in crisis, in catastrophes, it is because the politics are not thought for them, but I think as well, for people who have papers, who have visa, who have work, who have good health, who are not black or, you know, who are «normal», right? So in fact, the vulnerability touches people who are at margin of this reality. It's not so geographically fixed right now, for many, many reasons, related to metropolitanization, urbanization, globalization. So this is my main critics on your work, that otherwise I found really interesting, because it is point, a good point, a big point to discuss.

Thank you very much. Thanks Isabella. Guillaume and Bernard, do you want to add something?

GUILLAUME LIO : Yes, it's very easy to make a very good correlation with maps, but it's always difficult to see all factors that make this correlation. In fact, it's difficult, but it's a very strong, powerful mean of communication. If you put two maps and see, you can see with your eyes the same things. In fact, it's always local. I agree. Bernard? Oui, on parle bien du troisième exposé ? Yes.

BERNARD ANDRIEU : Yes. I am very interested by this presentation about the concept of inclusive artificial intelligence. I think it's a very interesting conception to accept. To accept that we are not in 1984, with a total control of my data, of all parts of the population. And if you have invisible minorities, if you have an undocumented workers, and it's good, I am very happy of that, because it's a sort of a possibility to invent inclusive artificial intelligence, to include the subjectivity, the partiality of information, the invisibility, the possibility for the people who don't have the information. Yes, it's very dangerous for terrorists and prevention and the danger, and the problem of health inequities. And perhaps you can use this artificial intelligence, like in my practice, we speak about inclusive physical activity. We have the opportunity to invent other possibilities of action with this population. And the vector of data of standardization of information is not a good method. Perhaps we have other solutions to make the contact, and we have this problem with people in the Amazonian forest, about the information of COVID. And we have the possibility of the contradiction between the cultural references of this population with proper medicine and our conception of contamination. And we can make a new possibility to make action with with this population. It's a good thing in your exposition.

Thank you very much Bernard. Maybe Francis you have some comments, since you are the tutor also of the group. Do you want to add something?

FRANCIS BACKEWELL: Yes, thank you. I'm biased and I also think that was the best presentation. I'm just kidding. No, thank you to everybody and thank you very much to all of the experts for weighing in as well. I have lots of things to say, about all the presentations, but I wanted to sit and listen to some of the expertise here with us today. I think, and with regards to that last presentation, all of this is happening so quickly, and seeing some of the ways that AI can harm these vulnerable populations, but help them as well, that it's difficult to know what the ultimate balance between those two things will be. And I think just Isabella was saying with Hurricane Katrina, we may not find out for many years what the actual impact of some of these interventions has been. In Canada, we just rolled out our contact tracing app, and within a couple of days, we have already identified issues. It only works on the most up to date phones. And so those populations who have older phone don't get to benefit from the technology. So even our best intentions can be limited by not thinking about all the vulnerable populations properly. And it's important, I think, that we don't forget about this and that we keep studying it over the next couple of years.

Thanks Francis, for these comments. We arrive to the end.

TÉMOIGNAGES ET ÉVALUATIONS DES ÉCHANGES

Afin d'évaluer la qualité des temps de formations vécus par les étudiants, outre le recueil de feedback directement auprès des participants et intervenants, trois questionnaires ont été diffusés au cours de la formation. Ils étaient transmis en ligne et les réponses étaient collectées sur la plateforme Survey Monkey. Le premier questionnaire a été adressé aux étudiants suite aux deux premiers jours d'introduction et de conférences ; il comporte dix questions. Le deuxième entretien a été diffusé à la fin des trois semaines de travail en autonomie avec l'aide du tuteur ou de la tutrice. Le dernier questionnaire a été rempli à la fin de la formation, dans la dernière heure, après la synthèse finale. Les contenus des trois questionnaires sont disponibles en annexe.

THÈMES D'ÉTUDE CHOISIS

Les sous-thèmes d'étude retenus ont été définis en fonction des attentes des étudiants et des orientations proposées par les encadrants. Cinq thèmes ont émergé : la sécurité des informations transmises et la responsabilité des soignants ; la question du transhumanisme lié aux nouvelles technologies ; la problématique des interfaces et de la téléconsultation dans les relations soignants/soignés; l'IA, l'accès à l'usage des nouveaux outils en santé et les disparités sociales ; et enfin, l'usage de l'IA en gériatrie et des nouvelles technologies pour les personnes vulnérables.

RÉSULTATS DES QUESTIONNAIRES

Ils indiquent tout d'abord que la qualité technique visuelle et audio des échanges entre les participants d'Ottawa et de Lyon était majoritairement évaluée comme bonne et satisfaisante, lors des temps de conférence et d'échanges avec l'ensemble des participants, sans atteindre une excellente qualité. Seulement 5% des participants ont décrit une qualité audio non satisfaisante. Lors de la mise en place des groupes de travail, les participants ont rencontré des difficultés à mettre en place les interactions, avec 42% des participants qui les trouvaient peu faciles (tableau 2).

Concernant les aspects organisationnels, tous les participants étaient satisfaits de l'organisation en groupe de travail avec un tuteur. Ils ont tous identifié un intérêt pour gagner en autonomie et en efficacité grâce aux outils de travail en commun à distance. En revanche, 36% des réponses mentionnent que les échanges virtuels ont beaucoup limité la qualité des échanges avec les autres participants. Ce mode distanciel a cependant facilité l'engagement dans l'évènement pour 79% des étudiants.

Concernant l'évaluation des apports pédagogiques, ils sont globalement bons. Les répondeurs ont apprécié les présentations individuelles, avec 63% d'appréciation «très bonne», les sujets des conférences ont été jugées pertinentes ou très pertinentes pour 94% des répondeurs, et les définitions des sujets des groupes de travail choisis collectivement ou également été appréciés par 94% des participants.

Les étudiants étaient satisfaits du travail réalisé par leur groupe pendant les quatre semaines, et ils pensent avoir appris des informations utiles pour la totalité d'entre eux. 93% des participants estiment avoir approfondi leur connaissance. Concernant les méthodes de travail, seulement 35% d'entre eux ont découvert de nouvelles méthodes.

Dans le dernier questionnaire, ils ont répondu que les présentations faites par les groupes de travaux étaient intéressantes, et leur ont apporté de nouvelles connaissances grâce aux échanges et retours des tables rondes qui faisaient suite aux présentations. Ils ont identifié des nouvelles façons d'étudier pour une grande partie d'entre eux, grâce à cette école d'été.

TABLEAUX 1, 2, 3: – Résultats aux questionnaires classifiés par domaines : technique, pédagogique ou organisationnel.

1. Domaine Technique

n°	Questionnaire 1 (July 3)	Unsatisfactory	Satisfactory	Good	Very good	Total
1	How did you find the technical quality of the audio exchanges on July 2 & 3?	5,26%	31,58%	47,37%	15,79%	19
2	How did you find the technical quality of the video/visual exchanges on July 2 & 3?	0,00%	26,32%	42,11%	31,58%	19
	Questionnaire 2 (August 3)	**Not at all**	**Not really**	**Somewhat**	**Very much**	**Total**
5	Were interactions with group members and your tutor easy to set up?	0,00%	42,86%	14,29%	42,86%	14

2. Domaine pédagogique

Questionnaire 1 (July 3)	Unsatisfactory	Satisfactory	Good	Very good	Total
Did you find the personal presentations on July 2nd to be enriching?	0,00%	5,26%	31,58%	63,16%	19
Did you find the topics for the conference presentations on July 3rd to be relevant?	0,00%	5,26%	26,32%	68,42%	19
Are you satisfied with the theme of study selected for your group?	0,00%	5,26%	15,79%	78,95%	19
Questionnaire 2	**Not at all**	**Not really**	**Somewhat**	**Very much**	**Total**
Are you satisfied with the de work you did with your group over the last 4 weeks ?	0,00%	0,00%	64,29%	35,71%	14
Do you think you learned useful information about your theme of study?	0,00%	0,00%	28,57%	71,43%	14
Questionnaire 2 (August 3)	**Not at all**	**Not really**	**Somewhat deepened**	**Deepened a lot**	**Total**
Do you think you have deepened your knowledge and understanding of the topic of AI in health?	0,00%	7,14%	35,71%	57,14%	14
Have you discovered any new forms of organization or work thanks to the virtual format?	14,29%	50,00%	28,57%	7,14%	14
Questionnaire 3 (August 7)	**Not at all**	**Not really**	**Somewhat interesting**	**Very interesting**	**Total**
Did you find the presentation of each group interesting ?	0,00%	0,00%	9,09%	90,91%	11
Did you find the round table sessions organized following the presentations to be interesting?	0,00%	0,00%	18,18%	81,82%	11
Do you think you answered some of your questions on the subject of AI and health ?	0,00%	9,09%	9,09%	81,82%	11
Do you think that you discovered new ways of studying thanks to these virtual exchanges?	0,00%	20,00%	70,00%	10,00%	10
Would you be interested in continuing to study the subjects of this year's meetings in a future summer school if you had the opportunity of participating again?	0,00%	0,00%	18,18%	81,82%	11

NOTES SUR DES RETOURS INFORMELS DES ACTEURS

Durant l'évènement, de nombreux échanges se sont tenus entre les étudiants, les tuteurs et les encadrants enseignants des Facultés de Médecine de Lyon et d'Ottawa. Les interactions informelles nous ont permis de recueillir un ensemble de commentaire positifs sur l'organisation de l'évènement : des présentations stimulantes pour tous, des discussions enrichissantes, une flexibilité des lieux de connexion personnalisant parfois certains lieux de vie. D'autres commentaires plus négatifs ont été recueillis auprès des étudiants comme par exemple la difficulté de trouver des créneaux de connexion en commun avec le décalage horaire, lors du travail en autonomie ; ou également, du côté de l'équipe des encadrants, le stress inhabituel lié à l'installation de dispositif de connexion qui peuvent parfois être instables à longue distance.

3. Domaine organisationnel

	Questionnaire 1 (July 3)	Unsatisfactory	Satisfactory	Good	Very good	Total
3	Are you satisfied with the way in which the trio work groups are organized with a tutor?	0,00%	10,53%	21,05%	68,42%	19
		Not at all	**Sometimes**	**A little**	**A lot**	**Total**
7	Do you think that this mode of virtual exchange facilitates your involvement in the event?	21,05%	31,58%	15,79%	31,58%	19
8	Do you think that the virtual exchanges have limited the quality of your exchanges with your partners?	15,79%	15,79%	31,58%	36,84%	19
9	Do these virtual exchanges (videoconference, whatsapp, telephone, etc…) promote autonomy and efficiency in your group work?	0,00%	26,32%	36,84%	36,84%	19
	Questionnaire 2 (August 3)	**Not at all**	**Not really**	**Somewhat appropriated**	**Very appropriated**	**Total**
4	Do you think that the 4 weeks of autonomous work with your group was appropriate for the task at hand ?	7,14%	14,29%	35,71%	42,86%	14
		Very much limited	**Somewhat limited**	**Not really**	**Not at all**	**Total**
6	Have the essentially virtual exchanges with your partners, your group and the supervisors limited your ability to work effectively ?	14,29%	42,86%	14,29%	28,57%	14
	Questionnaire 3	**Not at all**	**Not really**	**Somewhat**	**Very much**	**Total**
4	Would you have preferred to receive more direct guidance in the context of this remote work?	22,22%	33,33%	44,44%	0,00%	9
5	Did the fact that the exchanges were virtual interest you?	18,18%	27,27%	54,55%	0,00%	11

DISCUSSION SUR LES RÉSULTATS OBTENUS

Les résultats des questionnaires montrent une qualité pédagogique conservée, avec une pertinence des sujets et un suivi adapté. Cependant, les échanges entre les étudiants ont été moins riches humainement que lors d'une école d'été en présentielle. Les enjeux techniques et organisationnels ont été globalement bien gérés. Les encadrants ont montré un modèle d'adaptation et de résilience nécessaire pour la mise en place de ce cette école d'été virtuelle, en apportant les outils pour un bon déroulement technique, organisationnel et pédagogique.

La pédagogie utilisant les outils du virtuel se sont beaucoup développés ces deux dernières années. Nous y avons été contraints et nous avons dû faire preuve d'adaptation. Les enjeux techniques ne doivent pas faire oublier les enjeux pédagogiques, et notamment les principes FAIR de Harden et Laidlaw (2013). C'est ce que nous avons tenté de maintenir pendant cette expérience. Lors des écoles d'été précédents, les étudiants devaient travailler ensemble par petits groupes internationaux, sur le sujet de l'école d'été. Nous avons maintenu cela comme élément principal de notre école d'été, en insistant sur la pertinence des sujets : les étudiants les ont choisi, après discussion entre eux et discussion avec les tuteurs ; le feedback : les tuteurs fournissaient un feedback régulier, notamment sur les méthodes de travail, et les experts ont fourni un feedback sur le contenu même de leurs présentation, en ajoutant des éléments de réflexion ; ceci a permis à chaque étudiant d'engager une réflexion sur son sujet d'étude mais aussi sur ceux des autres groupes de travail.

Un certain nombre d'observations ont été faites sur la mise en ligne des cours en éducation médicale (Daniel & al. 2021, p 260); tant des constats positifs : amélioration de l'intendance, de la flexibilité, moins de temps passé en transport, temps de réflexion, facilitations d'échanges internationaux... que des constats négatifs : manque de relations sociales et d'interaction avec les collègues, la «fatigue du Zoom», les cybers menaces et problèmes de sécurité informatique. Dans la continuité de ces observations, nous avons fait l'hypothèse que les modalités virtuelles de notre formation auraient deux conséquences sur son déroulement réalisée en présentiel les années précédentes : une perte de qualité sur les échanges entre groupes d'étudiants éloignée dans l'espace et par les décalages horaires, un gain sur la flexibilité des travaux et l'organisation générale de la manifestation. Nous avons effectivement pu évaluer les aspects techniques, organisationnels et pédagogique grâce à ces questionnaires. Les réponses obtenues attestent d'une certaine aisance par rapport à l'autonomie procuré par le mode virtuel et l'auto-organisation en sous-groupe de travail. En revanche, on note de manière évidente un engagement moindre des étudiants dans leur rencontre avec d'autres étudiants, par rapport aux éditions en présentiel. Les étudiants mentionnent clairement que ces relations à distance ont limité la qualité de leurs discussions. En effet, il n'y a pas de partage de temps de vie, de repas, ou autres moments de détente qui étaient l'occasion de découvertes et conversations importantes, d'expériences mémorables et d'évènements de vie en commun. Cette expérience sans proximité physique limite les temps possibles d'observation et de compréhension des comportements émotionnels et attitudes de chacun face au questionnement sur leur connaissance de la médecine. Ces éléments ne peuvent pas être rendus dans cette édition virtuelle. Nous avons toutefois construit un souvenir de cette édition avec la réalisation d'un film disponible en ligne (1). Nous avons ainsi pu garder une trace de ce partage d'expérience entre les étudiants français et canadiens, sur le sujet des humanités en médecine pendant la pandémie.

Sur l'organisation virtuelle, certains notent tout de même qu'elle a pu les aider à découvrir d'autres modes de collaboration ou à encourager leur travail en autonomie.

Concernant le thème d'étude de l'école d'été médecine et humanités 2020, l'Intelligence Artificielle (IA) est souvent perçu comme un sujet complexe et porteur de préjugés négatifs, comme l'a remarqué l'école de médecine de Duke University lors de leur symposium sur le sujet « Artificial Intelligence in Healthcare : Insights from an Educational Forum » (Barbour & al. 2019). Cependant, les chercheurs ont évalué par questionnaire que leurs participants - qui estiment au départ leur compréhension pauvre sur le sujet - avaient nettement amélioré leur connaissance et finalement développer un regard plus positif sur le sujet. Nous avons constaté également que nos étudiants estiment en grande majorité avoir amélioré leur connaissance sur l'IA. Ils étaient satisfaits des réponses qu'ils avaient trouvé face à leur problématique de départ. On peut faire l'hypothèse que cette satisfaction d'apprentissage avancé sur l'IA est d'autant plus élevée que c'est un sujet qui manque très souvent de transparence et d'explication notamment sur ces applications réelles (selon Markus, Kors et Rijnbeek 2021).

1, Documentaire de 38 minutes synthétisant les différentes étapes de l'école d'été 2021 : https://youtu.be/CN3-kBjQIVg

Il est intéressant de noter également que les thèmes d'études retenus par les cinq groupes d'étudiants couvrent respectivement les trois premiers des quatre principaux thèmes éthiques communs abordés par la littérature scientifique (selon Murphy & al. 2021): la sécurité, la responsabilité, la confiance dans les technologies de l'IA, et le problème des biais ; et également deux des trois principaux thèmes dits spécifiques énoncés par les auteurs : les robots soignants (abordé par nos étudiants par l'exemple des personnes âgées), les diagnostiques (abordées par l'accès aux téléconsultations) et celui de la médecine de précision. La question de la vulnérabilité remis à jour par la crise sanitaire et repéré par le réseau national de formateurs et de chercheurs menant des travaux sur l'éducation à la santé (UNIRéS, Verheye et al. 2020), a été mentionné par les étudiants dès leurs premiers échanges sur les choix des thèmes jusqu'aux tables ronde finales.

Cette organisation a engagé chacun dans une expérience d'adaptation, de résilience, pour renoncer à l'évènement attendu de rencontre avec les autres étudiants. Cette résilience est probablement un point que nous avions aussi à transmettre aux étudiants en médecine (Wald et al. 2021). Les encadrants ont rempli leur modèle de rôle (Goldie 2012) en persévérant dans le maintien de ce programme. Ce sont aussi les étudiants et l'enjeu de formation qui ont engagé les enseignants à organiser ces modalités de formations pendant l'été 2020.

CONCLUSION

La 4ème école d'été Médecine et Humanités organisée en 2020 entre les universités de Lyon, Ottawa et Shanghai, aura été sous plusieurs aspects exceptionnelle. Tout d'abord parce que les partenaires canadiens et français ont maintenu l'événement dans une période de crise sanitaire ou la majorité des évènements internationaux étaient annulés. Ensuite parce que la formation s'est déroulée pour la première fois en mode totalement virtuel, entre Ottawa et Lyon. Pour la première fois également, les deux universités chinoises partenaires de Shanghai n'ont pas pu participer au regard des conditions exceptionnelles.

Les résultats des questionnaires menés durant la formation montrent que les échanges distanciés auront compliqué la collaboration des étudiants en groupe, dans leur interaction avec leurs camarades et tuteurs. Néanmoins, les participants expriment clairement leur satisfaction du contenu des présentations, des échanges, des conférences et des restitutions de leurs travaux donnés. Ils mentionnent également que malgré les difficultés occasionnées par ce format virtuel, certains ont pu découvrir d'autres organisations de travail à distance.

Cette école d'été virtuelle a permis d'engager les étudiants dans une activité de construction de réflexions autour du thème de l'AI, en partageant leurs connaissances et leurs expériences, à un niveau international. Des aspects sont donc positifs et ont montré la possibilité de proposer une formation sous ce format. Nous conclurons avec la perspective de Harden et Hart déjà énoncée en 2002 : « An international virtual medical school (IMMEDS) : the future of medical education?". Nous avons constaté certains bénéfices qu'ils mentionnaient déjà dans ce type de formation virtuelle : une flexibilité dans la concentration ou l'expansion du nombre d'étudiants accueillis, un accès plus large pour tout type d'étudiants avancés ou débutants, un modèle d'éducation moins coûteux, ou encore l'opportunité d'accompagner des médecins ou futurs médecins à se former continuellement sur les besoins et changement des communautés sociales (Harden & Hart 2002, p 264).

Il est intéressant de noter également que les thèmes d'études retenus par les cinq groupes d'étudiants couvrent respectivement les trois premiers des quatre principaux thèmes éthiques communs abordés par la littérature scientifique (selon Murphy & al. 2021): la sécurité, la responsabilité, la confiance dans les technologies de l'IA, et le problème des biais ; et également deux des trois principaux thèmes dits spécifiques énoncés par les auteurs : les robots soignants (abordé par nos étudiants par l'exemple des personnes âgées), les diagnostiques (abordées par l'accès aux téléconsultations) et celui de la médecine de précision. La question de la vulnérabilité remis à jour par la crise sanitaire et repéré par le réseau national de formateurs et de chercheurs menant des travaux sur l'éducation à la santé (UNIRéS, Verheye et al. 2020), a été mentionné par les étudiants dès leurs premiers échanges sur les choix des thèmes jusqu'aux tables ronde finales.

Cette organisation a engagé chacun dans une expérience d'adaptation, de résilience, pour renoncer à l'évènement attendu de rencontre avec les autres étudiants. Cette résilience est probablement un point que nous avions aussi à transmettre aux étudiants en médecine (Wald et al. 2021). Les encadrants ont rempli leur modèle de rôle (Goldie 2012) en persévérant dans le maintien de ce programme. Ce sont aussi les étudiants et l'enjeu de formation qui ont engagé les enseignants à organiser ces modalités de formations pendant l'été 2020.

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ANNEXE : COMPTE RENDU DES TABLES RONDES

1. Information, sécurité et transmission

So we will start now with the first presentation: Group 1 with Rémy, Christina, Noémie, and Ali as tutor, about «Artificial Intelligence, information, transmission and security». So Rémy, Christina, Noémie, we are waiting for your presentation.

We can get started. I'm Christina, and I'll be starting the presentation today on fake news in the pandemic. So (inaudible) fake news, we think of it as the circulation of fake information through either traditional media like newspaper (inaudible) or through online channels like social media. And this definition includes both misinformation and disinformation, with the difference being that disinformation includes the intent to actively mislead the reader, while misinformation simply refers to information that's not true. So when we look at who spreads fake news in our world, it's a common tactic by political parties when they're trying to sway voters in their favour. But also, organizations with extreme or rather untraditional beliefs will also resort to these tactics in order to convince the general population, to either adopt the same beliefs that they value, or to take certain actions. And as well, with ongoing AI research, we know that computer bots are also capable of generating artificial news as well. It's interesting to note that fake news actually spreads faster than true information.

So our next step in this process was to kind of explore what it is about our human nature that makes us fallible to believing fake news. Sometimes it is a genuine lack of knowledge, when we're not subject matter experts, but a lot of the times it can also be a result of lazy thinking or using cognitive (...) Especially when we're scrolling through feeds like social media, where there is a huge volume of data and we need to be able (...) You're a (...) When you're caught up in the emotional destruction, it's harder for you to be able to spot the logical fallacies and you're less likely to stick with critical appraisal through what you're reading. So we see fake news on social media, but we also see it in the scientific community as well in the form of bad science. For example, many years ago, there is the paper that tried to claim vaccines cause autism. And so looking at the motivation for bad science, there's generally a pressure in academia to publish positive results. And this pressure increases when the pharmaceutical or medical device industry is financially supporting research. In rare cases, scientists can also publish bad science for individual desire for career advancement. And these papers can fall through the cracks when the peer review process is too lenient. So some general recommendations out there in terms of how to spot fake news is to look at the source of the information and to consider the author's credentials and how their conflicts of interest might bias their messaging. Also, like I mentioned earlier, being aware of very emotional or very polarizing headlines and also looking at which platforms these stories are being shared on.

So as well, we can also use AI to help us detect fake news. And there's two ways we can use AI to do this. One is sentiment analysis using natural language processing. So this basically refers to identifying keywords in a text message and using these keywords to quantify objectively the evolution or the tone of the language. So this keyword mapping can be done using a preestablished set of rules, or we can use machine learning as well.

The other way AI can help us detect fake news is through image, for instance. I think we're all familiar with software like Photoshop that lets us manually edit photos, but we can also use advanced AI techniques like GANs to generate photos from scratch. And what AI can help us do with these tampered images is to look at the image metadata and see if it's been compromised in any way, which would indicate cause for concern that the photo is fake. And when I mentioned image metadata, what I mean is that each photo has a unique encoding that identifies specific features. So for example, from the metadata, I can see what type of camera you use to take the photo, if you use flash and what the pixel dimensions of the original photo was. So synthesizing together this background information about fake news and AI, I wanted to further explore two questions, which (...) how does access to information impact a patient's ability to consent, and secondly, what ethical responsibilities do physicians have as mediators of patient education in addressing misinformation and delivering evidence-based care. So we explored these two questions through a combination of independent research and physician interviews.

All right, so I have some examples of fake news we heard a lot during the pandemic, like spraying and introducing glytrol or another disinfectant into your body will protect you against COVID 19, thanks to Donald Trump. We heard a lot that the prolonged use of medical masks when properly worn causes CO2 intoxication or oxygen deficiency. This can bother us a lot there. These fake news were extracted from an article in which the World Health Organization was debunking some fake news we heard about COVID 19. So this fake news had some impacts. You can change, Christina. Thank you. So they had some impacts. I talked about that with Ali, our tutor. He's also intern in pneumology, so we made a little interview. He saw chronically ill patients with diseases like lung cancers or things like that, postponing or abandoning some part of their follow up. So for him, it was loss of a chance for them on their cancer. He also saw some new patients with new illnesses being diagnosed really late. There were no patients in the emergency room, but patients still had strokes, so they had strokes at home and didn't came to the hospital because of the fear of COVID 19. And some patients ill with COVID 19 rejected some treatments and rejected being included in clinical trials because they wanted specific treatments. I think Christina asked Dr. Bakewell about that and it didn't happen that much in Canada, but we saw it a lot in France. There was also a lack of trust in doctors. Some people didn't understand why they weren't given a specific treatment. And it's led us to people thinking that maybe doctors were part of like wanting to kill them or things like that, that are really absurd. And finally, physicians had to spend a lot of time deconstructing misconceptions. That's part of our jobs. But it took a lot more time than before when it came to educating patients. So about the consent of consent. The Nuremberg code defines a true informed consent as the fact to have sufficient knowledge and comprehension of the elements of a subject matter to be able to make an understanding and enlightened decision. So as we can see, it doesn't really depend on disclosure of informations from a physician. Even if we give all the information to a patient, that doesn't mean he could be considered consenting because he has some misconceptions about the disease, about the treatment. So we have to address that. So additionally, a physician must communicate information in the most loyal, clear and appropriate way. It's something we learn a lot about in (inaudible) it's really difficult to know how to give a really clear and appropriate information. Next slide. So what does that imply? It implies that as physicians and members of the medical community, we have two major responsibilities. One responsibility is to communicate some scientific information to patients transparently. With an example, risk communication.

How do we explain risk correctly to patients in clinical trials? And we have responsibilities as members of the medical and the scientific community to educate the population and take this misconception of the population into consideration, because misconceptions play a part in the comprehension of the elements of the subject matter. So they do take a part in... if we decide to study if a patient is really consenting or not.

I wanted to add some things about the responsibilities that I learned during the interviews. Christina interviewed Dr. Bakewell. Thank you, Bill. We, as doctors have to inform patients with the most up to date data, mostly during the pandemic, because it could be hard for the general population to have access to true information about the disease. And we have to inform them so they can make the most informed choices. After that, we still have to respect the patient's final decision, even if it's hard to inform them as well as we do when we have diseases we really know of. I have a little audio extract here. I hope it will work for everyone. It's from...

... (probably given) a patient needs to have received the information appropriate to making an informed choice. Usually it's to find the information that a reasonable person would expect to have, but it's not the same information that a physician, for example, would know about a topic, but what a reasonable person wants to know. However, that's just the information that they must receive. There's no exclusion on them receiving other information or bad information from other sources, nor for them making decisions based on that. So I guess at the end of the day, I would say as an example that if I've explained that particular course of action that I think is appropriate, but a patient rejects that based on their understanding of some other piece of information, if they're capable of making that decision, then that is informed consent.
Another responsibility that I talked about with Ali, he thinks that it is perhaps the role of the scientific and medical community to carry out educational work, or rather a work of simplification and synthesis of medical information. That is for things like vulgarization. We, as doctors had easier access to true information, to new studies, but it was sometimes hard for the general population to navigate through that. So not for physicians alone, but as a community, we have to promote this vulgarization that works, (inaudible) during the pandemic here. I'm OK with this one.

Hey, Remy, I think your mic is muted.

Excuse me. So, I start again. One example of risk communication is communicating good statistics to patients because we have recent studies by psychologist Gerd Gigerenzer about good communication of statistics, and he thinks risk literacy is key to a better understanding from a patient and from a physician. Studies showed that the statistic presented as percentages are far more misleading than when they are presented as natural frequencies, and that those frequencies are things like three out of 10 or half of a population, things like that. It's a very well documented phenomenon since 20 years, but we still talk with percentages when we talk to patients and the media, like 2%, would say: «you have two percent of chance to die from the coronavirus», even for a population who doesn't really understand this type of statistics. And on the next slide, you can see that it's better to foster inside, to talk with natural frequencies for a single event probabilities, but also with conditional probabilities, as if you have coronavirus and you are 80 years old or more, you have 20 percent chance of dying, it's not really well understood by the population. When I talked to families or friends about it, it was sometimes very misleading for them. Next slide. We can also educate the population as a member of the medical community. Social media are considered more and more important today. For example, the Center of Disease and Control and Prevention provides us with social guidelines in order to communicate efficiently on the social media like Facebook or Twitter. Some examples are to clearly define the objectives, to know your target audiences, identify the best platform, keep content short and simple, give the most important information first, etc.

Next slide, please. We can also take lessons in risk communication about the SARS because we already had SARS pandemic, SARS epidemic, because it was in Canada only. But for example, we could have mitigated the crisis if health care had been able to give more accurate information to patients. And it was a sentiment that a lot of Canadians had during the epidemic, that we didn't really give accurate information at the time. Another example was the Chernobyl accident. The World Health Organization said that (one of the health problems) was one of the largest public health problems created by the accident and it was partly attributed to the damaging psychological impact of a lack of accurate information for people who had to live through the crisis.

So to conclude, restraining access to fake news is important. We also have to give to the general population accurate information, and for that, we have psychological studies to better communicate the risk to the population. We also have a lot of guidelines and guides to manage social media.

I wanted to add something about freedom, and after that give some ideas for the future. We talked a lot about fake news and about what artificial intelligence could do about that. But we still have to be careful with censorship because there is a grey area between our freedom of speech, the freedom of the net and what we can do to avoid spreading fake news. Something that we can do, that is not censorship, is vulgarization. It was already done during the pandemic by the World World Organization and by the government. But as at the beginning, they tried to avoid panic, sometimes there was a little dichotomy between what was said at the beginning in early March and what was said after that. And it leads us to a lack of trust in these sources for some people.
There were also a lot of initiatives that were lacking publicity, like Hospices Civils de Lyon made some really good videos about COVID 19, but they weren't heard as much as fake news were at that time. So maybe we will have to work in the future about the popularity of these sources of vulgarization.

And finally, in a more long term view, Ali thinks that it would be important to have awareness-raising courses in classes, so that children can learn from an early age how to be critical when it comes to information. Finally, I have some advices here for a non-medical public given by Ali during our interview. I hope the video will work well. It's in French, but it's translated :

«Je pense qu'il faut toujours essayer de mettre en relief ce qu'on voit sur les réseaux sociaux, ne jamais prendre pour vrai, toujours aller vérifier avant. Ne pas juste lire le titre, mais cliquer, tu vois, OK, c'est quoi, ce site ? Est-ce qu'il est fiable ? Du coup, tu regardes quels sont les autres articles publiés dans ce site. Et si tu vois que c'est : «Comment soigner les mycose vaginales en se mettant une gousse d'ail au (vagin)», exemple vrai, c'est pour ça que je le cite, à ce moment-là, tu dis, il se passe quelques chose, est-ce que je peux faire confiance à ce site ? Probablement pas. Regarder aussi les auteurs. C'est qui, ce gars ? Un journaliste, un médecin, un biologiste ? Quoi ? Quelle est sa légitimité ? C'est un site, mais un site de quoi ? Qui relève de qui ? De quoi ? Je crois que c'est vraiment essayer ne pas croire ce qu'il y a par principe, plutôt que croire par principe tout». (suite page 7).»

2. L'Intelligence Artificielle et le transhumanisme.

Le groupe 3, sur le transhumanisme, avec Jade, Maël, Francis et Mehdi qui est avec nous comme tuteur.

Thanks again, group 1. So I'm just going to give a bit of a background of how I'm going to present this presentation. So we had a bit more content than the 15 minutes. So what I'm going to do is I'm just going to highlight the important slides, and what we did for almost all the slides is we added the voiceovers over each one of the slides. So for the ones that are the highlights of our presentation, I'm going to play them as well. Also, you'll notice the presentations in French, but I will be speaking fully in English and translating as I go to the essential points of each slide. So without further ado, my name again is Jade. I'm representing Ottawa, I'm a third year medical student, and I'll be presenting on behalf of my two colleagues, Francis Demontigny, which is also a third year medical student at U. Ottawa and Maël Plémert, who is an externe in second year Lyon.

So this slide here, which is the myth of Prometheus, this was to kind of introduce the concept of transhumanism, so I'm going to skip that to just jump right in. Here, we have the definition, which is going to be the basis of what we're going to talk about later. So as you can see here, what is transhumanism? It's the concept of improving or augmenting indefinitely using material technologies, the capacities and the cognitive, emotional and physical performance of individuals.
Jade sorry, it looks like, I don't know if you have switched the slide, or it's like...

I'll wait a good 10 seconds, maybe, when I switch the slide, or so. OK, thank you, Dr. Bakewell as well. So now I have the definition slide. You guys all see that? Good, OK, perfect. So I was saying, here we have the definition of what is transhumanisme or transhumanism. So it's the concept of improving or augmenting indefinitely, using material technologies, the capacities and cognitive, emotional, physical performance of individuals. That's essentially the gist of what this definition is. And here we'll have Maël, my colleague, elaborating a bit in detail. So I apologize, it's in French, but we wanted to have a mix of both languages.

Actuellement, nous allons définir le transhumanisme. La définition présentée est issue d'un article de Gilbert Hottois, qui est professeur à l'Université libre de Bruxelles, et membre de l'Académie Royale belge. Cet article est issu du quatrième Traité de bioéthique, dirigé par Emmanuel et François Hirsch. Gilbert Hottois nous dit qu'en 1950, Julian Huxley, qui est le frère d'Aldous Huxley, connu pour avoir écrit Le meilleur des mondes, nous dit que le transhumanisme serait l'abréviation de l'humanisme évolutionnaire, evolutionary humanism. C'est-à-dire, l'humanisme évolutionnaire, on a bien une idée de dynamisme, de perfectibilité, et aussi dans le darwinisme que l'on connaît. Julian était aussi le premier directeur de l'Unesco, cet organisme de l'ONU qui vise à scolariser les enfants dans le monde et favoriser l'éducation. Ainsi, il voulait faire de cette philosophie son guide pour son action politique à l'Unesco. Si on lit maintenant la définition...

Alors, because I talked about the definition, I'm just going to continue on. So now I switch to the next slide, I'm just going to wait a few seconds before starting. But essentially here, what we're going to talk about now are the three major philosophical ideas that we'll elaborate, the first one being that we use medicine in a therapeutic matter to improve and augment, the second one being the concept of increasing longevity of life, essentially living longer, healthier and staying young, and the third one being the concept of eugenism. We have here the concept of fighting against natural inequalities. The concept of from chance to choice. So we will be playing here Maël's recording.

Nous allons poursuivre en présentant les trois idées philosophiques majeures selon Luc Ferry, qui a écrit La révolution transhumaniste aux éditions Plon en 2016. Il nous dit que l'humanisme évolutionnaire, ou transhumanisme, comme nous l'avons vu, rebat les cartes et réinterroge de grands concepts de la médecine. Le premier concept est celui issu de la médecine hippocratique, l'idée de caractère thérapeutique de la médecine, qui corrige les déficiences, qui tente de guérir les maladies, et quand elle ne le peut pas, au mois, essaye de soulager ou de consoler le malade. Maintenant, cela n'est plus, on passe dans une autre dimension, cette médecine doit devenir méliorative, elle doit augmenter. Ceci donc réinterroge la dualité du normal et du pathologique, qui est remplacée par celle de l'ordinaire et de l'augmenté. Il nous dit qu'on est déjà dans des situations intermédiaires aujourd'hui avec la chirurgie plastique, la vaccination qui tente de prévenir les maladies infectieuses, en les supprimant, en tentant même de les éradiquer avant même de tomber malade. Ou encore le dopage, qui est clairement une logique d'augmentation des performances, notamment sportives. Il explique qu'il n'y a aucune différence. Pourquoi voir un caractère éthique à soigner le pathologique et non le normal ? Si on prend deux personnes qui souffrent de petitesse de taille, l'une pour cause génétique, et l'autre pour cause constitutionnelle, c'est-à-dire que sa famille, sa société, sont des gens petits par nature.

Pourquoi on irait tenter de corriger celui qui en souffre par aléa génétique, et non celui qui en souffre parce que c'est constitutionnel et c'est comme ça. Donc il dit qu'il n'y a pas que le pathologique à soigner. Ça fait penser aussi aux réflexions de Georges Canguilhem, ce médecin philosophe qui expliquait que c'était le malade qui définissait sa maladie par son vécu subjectif. Je vais vous lire une citation sur laquelle j'avais travaillé, issue de Le normal et le pathologique, son œuvre majeure. «C'est donc d'abord parce que les hommes se sentent malades qu'il y a une médecine, ce n'est que secondairement que les hommes, parce qu'il y a une médecine, savent en quoi ils sont malades.» Dans cette citation, tout s'explique. Il dit que la médecine se définit donc par la plainte du patient qui s'exprime auprès du médecin, et donc le but du médecin est de résoudre cette plainte.

So that captured a bit the gist of what you were trying to say there. So now we will continue on the same wavelength with Luc Ferry. So Luc Ferry here, -I hope the slide will show up soon for you guys- talked about eight innovations that refer to the transhumanisme or transhumanism. And because again of the lack of time, I'm just going to simply name them here. So he mentioned there was an acronym. It was an acronym that works in French, NBIC, with N for nanotechnologies, B for biotechnologies, I for anything related to computer technology and C being cognitivism, he called it or artificial intelligence, that he divided into strong artificial intelligence a weak artificial intelligence. So very quickly, weak artificial intelligence, he gave the example of someone who was playing jeopardy, which is a game where people give you questions and you have to come up with the word that answers the question, and you'd have a computer that's able to read through two thousand lines a minute, for example, or a second, and basically come up with the answer really quickly and effectively. And strong artificial intelligence, simply put, he explained it as a capacity of the AI, or the artificial intelligence, to be aware and conscious of itself and of its emotions. We also have 3-D printers that will be able to print organs. He mentioned a heart, a kidney, which is truly fascinating, which leads also to the next point, which is the concept of tissue engineering and regenerative medicine to make artificial organs. There's also a lot of research being done on stem cells and modifying the genome when the human being is still a fetus.

And he was explaining that if we were able to have a sequencing of the genome before the baby's even born, and let's say, for example, someone has a delete mutation or an addition or whatever it is, that we would be able to have a chip inside that would scan that, and that would be able to remove that error before it's even produced. And lastly, there's a concept of robotics and the question that we all ask about what role robots will have in our day to day careers, and if they will be able to replace some jobs or all jobs. So now, what we have here is that Francis, who is a student at Ottawa, and Maël, who is a student in Lyon, give a few examples of things that they saw when they did their electives or the observerships in the hospital, of AI.

Again, I'm just going to name them for a matter of time here. So we have prosthetics. You can see pictures here. We have pacemakers, cochlear implants using extracorporeal circulation or ECMO in French. And then here we have the concept of shortening vocal cords. That was an interview that Maël did with a phoniatre at Lyon. And the concept is for the people that do a conversion of sex, what they would do is that they would shorten the length of the vocal cords so that a man, or an initial person who was a man, when doing the surgery and all of that, when they shorten the vocal cords, they would have more the voice of a woman. So that was just an example of that. Now, we had the true privilege and honour of interviewing as well Dr. Bakewell, so you'll hear a bit what I asked him about, so I'll just play it right now.

Hello, my name is Jade here, and we have the honour and privilege to have Dr. Bakewell, who was part of the summer school program, to discuss a bit with us today on the idea of artificial intelligence. So without further ado, Dr. Bakewell, thank you for being here with us today. We wanted to ask you, as an emergency physician, can you give us a few examples of applications of artificial intelligence?

Sure. Some of the applications (inaudible) that we're seeing come out across all of the medicine, but they're going to have a particular importance and relevance in the emergency room, so one of those (inaudible) radiologists (that have changed), but that's of special importance in the emergency room for a couple of reasons. One is that we rely on speed and efficiency. And so, being able to get (let's say) a read of chest X-ray or a cat scan of the head more or less efficiently would be a huge impact in allowing us to keep patients moving, kind of flowing to an emergency room rather than having to wait for a read from radiology. And similarly, we work on our (inaudible) and so we don't know (how) (inaudible) of radio (inaudible). That would obviously (inaudible) soon. (Inaudible) application of AI. And another one...

Are you guys able to hear the interview?

It's not very clear, is it chopping a lot, Marceau?
It's just a bit far. We understand a bit, but it's hard to understand. Maybe you could resume?

Yes. OK, perfect. I'll just do that for the amount of time. Thank you very much and I apologize for the technical difficulties. But what Dr. Bakewell was essentially saying is how we would use artificial intelligence in the emergency room to scan patients effectively and quickly. And it would be a method of triaging people's conditions so that when they come to the emergency room, we'd be able to better know how we can help them and how we can serve them. So that was a bit the gist, that's too bad that I won't be able to play the full thing, but it's for reference and Marceau, after, when you guys can look at it. So because I have only a few minutes left, I'm just going to finish off with the discussion. So we had four major themes that we talked about, and I'm just going to skip right to the third one, which is the concept of identity. And I'm just going to play... Actually, I'm just going to summarize it because of the lack of time. So we had Maël on one side and Francis discussing, so we were asking, does artificial intelligence affect our bodies? So would we still be our body? Would we keep our body? If we do anything to modify it, would we still be ourselves? So on one side, Maël was saying: «I think that we would keep our identity», whereas on the other side, Francis would say, well, as long as we're not adding something in ourselves, that we would keep our identity, but in other contexts, identity would be compromised. And they were discussing and debating to what extent is, for example, Jade going to stay Jade if he uses more and more artificial intelligence. And so I'd like to thank you all for your attention for our presentation. Once again, I apologize for the technical difficulties and I hope that at least some of it too has caught. And I just wanted to thank everybody for the opportunity to have been able to work with all of you. Despite that, the distance between one another, it was a true pleasure working together and I hope to meet you all in person one day. (suite page 10)

3. Les interfaces entre soignants et soignés.

Yes. First, group 2. So, Jake, Barbara, and Raphaël, please install your presentation.
We have a bit more time today. You can have 15 minutes, a little bit more if you need, but no more than 20 minutes for sure.
I just (connected) my screen, do you see it? Yes.

Okay. Today we're going to ask ourselves to what extent the new interfaces improve the relationship between patients and health workers. So first of all, we're going to talk about communications and new interfaces in medicine such as telecommunications, mostly. There are few questions we see, the first one being about the need for teleconsultations. The second one is about when and how to use it. And then the third one being about the future of telemedicine and what tools we are going to need. This was elaborated with the help of Louis Malachane, the Medical (doctor) of Leah, a teleconsultation website, and with personal research. So, the need for teleconsultation: before, it was thought that not so many people would use it, and you could think it would help disabled people, who wouldn't have to go to the doctor physically, which can be a real burden. There would also be medical deserts, rural areas, where there are not so many doctors. It turns out we found a new need today. It is in times of crisis, such as the COVID crisis with social distancing and confinement, where we weren't able to physically go to the health worker's office. So, there has been a huge growth of teleconsultations at this moment. It went from a few hundred teleconsultations per week in France, to millions, on several websites, such as Leah or Doctolib. And this growth has been observed not just during the crisis, it kept going on after the crisis. Today, even though we are not confined anymore, there's still a big use of teleconsultations, way more than there was before. And we can see it doesn't actually have the problem of medical deserts, for instance, that we thought it would help because most people using telecommunications actually live in cities, and 20% of them are in Paris, for instance, in France. So, now that we know we need it, we have to ask ourselves when and how to use it, who uses it, mostly (amongst) health workers. These (tests) are from the Leah app, but they're more or less the same for any website that does teleconsultations. It's 82% of general practitioners, 7% of psychiatrists, 2% of allergists and endocrinologists, and then 7% of the remaining. There are also rules for teleconsultations to be reimbursed by the French health system which are that the health worker and the patient must know each other. They must have worked together or seen each other during the last 12 months. And the health worker must be the one initiating the teleconsultation. This seems an optimistic way to have a teleconsultation. It is that indeed, you should know your patient before meeting them on a screen for the first time. Then, we know which situations are most suitable for teleconsultation. Of course, you won't deliver big bad news over teleconsultation, and it's more helpful for the follow-up of chronically ill patients, or explanation, and prescription of upcoming medical acts such as a vaccination. You could see your patient via teleconsultation (when) you need to do (this) vaccine, and then, actually, have them come only when you have to do the shot. So, we see that there are many uses for regular general (practitioner in medicine), (or) psychiatry too, and follow-up with chronic patients, but we always have to be mindful of how we use it. It is not because we know a patient that you have to always do teleconsultations. Since in psychiatry, even though the patient may feel more at ease and they (dare) to speak (more) in some situations via telecommunications, there's also a danger that some patients react (badly) to teleconsultations, such as having a psychotic crisis because new technologies may trigger hallucinations, for instance.

Or in other situations, with someone who could self-harm, it is way better to have them face to face with you, and actually, be able to protect them rather than have them over a screen, and perhaps feeling powerless. So, this makes us think about the future of telemedicine. As we see it, it is a big tool we are going to use. Teleconsultations are adopted today. Everyone uses them. It relies on the trust and the relationship between a doctor and patient, or between any health worker and a patient. But to build this trust, we need to have tools that (need) to be taught by our universities. (inaudible), we need to (be taught) ethical tools (for this type of) communication and how to communicate over a screen when all facial expressions are not as easy to see, for instance. And then we also need the technical tools which are medical informatics. We will rely on teleconsultations, and therefore, if there's a little problem, we must be able to get over it, to know how to fix our connection, or things like that, which need to be taught too. And we must not forget that teleconsultations are just a small part of telemedicine, and there are a lot of other projects in telemedicine that are developing, such as remote monitoring, which (implies) monitoring the patient's home, and you receive information directly on your computer at your office. And so, this remote monitoring, and this small form of IA, and (much) bigger technology, raises more regulations (on) the question of responsibility and errors which Jake will be talking about.

Okay. So, is it okay if you move to the next slides for me?
Is it all right?

Oh, sure. And I think a few slides are missing, but I can talk over it. It's fine. So, through this section of the presentation, I'll address the issues of responsibility and blame for medical errors regarding the use of AI in medicine. It's a pretty complicated issue that's yet to be resolved in the world. So, I'll do my best to outline the key players and the issues, and the schools of thought. And then, at the end, I'll touch on some predictions made by other authors and myself for how AI will be integrated into medicine and how we can ensure safety and efficacy for patients. So, the main question we're looking at is who bears the responsibility for making these medical decisions? And as a result, who bears the responsibility when inevitably some mistakes are made? So, let's begin by reviewing the precedent set by today's current standards of therapy and comparing them to the complications brought about by AI. So, here we are, and traditionally, patients are cared for by a team of health care workers, so that poses a similar question of who's to blame when errors occur. Say, for example, a medical resident misdiagnoses a patient, we have pretty clear guidelines that say the attending physician is still responsible for the patient. In legal terms, we refer to the attending as the most responsible physician. In this way, residents are rarely signing off on medical decisions without oversight from an attending. However, this redundancy in practice is of secondary use for training residents. If we used AI programs in the same vein, it would not help physicians become more productive. For that to happen, some element of responsibility must be transferred from humans to an AI program, so it can complete work without any oversight. Which brings us back to the main focus: if that's the situation, who is then to blame when the AI program makes the mistake? So next, we can see that we have three options to consider: the manufacturers of the product, the doctor who administers its use, or for some theorists, (inaudible) the AI program itself. So, on the next slide, we'll review each one and consider the feasibility of holding these parties legally responsible, as well as the consequences of placing blame on them over other parties. So first, we look at the manufacturer. In this view, we have to consider the AI program as just a medical device, like no different from an MRI machine, or a pacemaker. This line of reasoning can only exist if the error can be traced back to a flaw in the development of the product. So this is a pretty difficult task. In order to accomplish this, there must be glaring oversight that goes beyond reasonable expectations. For example, we now all know of the importance to ensure using an unbiased training sample. However, that wasn't always obvious, and to place the blame on the manufacturers in the first instance of that ever happening would be unfair. Nobody knew it was so important. Secondly, this method requires plaintiffs, so people suing the manufacturer, to understand the inner workings of a complicated program in order to address these mistakes.

So for both these reasons, I believe that blame the manufacturers is not very feasible. On the next slide, I want to talk about another issue brought up when considering placing legal liability on the manufacturer. And that said, these AI programs are constantly learning from experiences and changing over time, so they're evolving. Many manufacturers would argue that these changes are beyond their control and that they can't be held accountable for anything other than the initial product they handed over to physicians. Personally, I disagree with this argument. In Hebrew, we have a phrase (foreign language). It means «even more so». And if a TV comes with a warranty, or software like Adobe comes with monthly updates, then (foreign language) a program as important as AI software that is applied to human health and should have ongoing oversight and support from the manufacturer. The answer to me, as you'll see, is a recurring theme. It's transparency. So having transparency in programming will help with comparing the current state of the AI program when something goes wrong to when it was originally handed over to the user. So next, we'll look at what happens if we consider putting the blame on doctors. In this view, we have to see the AI program as an assistant to the physician, and consequently, the doctor is still responsible for any mistakes made. As a result, the doctor doesn't save time but may increase their accuracy. That's because they still hold all the accountability, and must review the decisions of the AI program, and may be alerted or reminded of potential solutions by the AI program, but they can never fully entrust the decision-making to the program, or else expose themselves to litigation. I wanted to bring up this prediction, so (Saura Jha), she wrote an article for Stat News with a really interesting proposition. Oh, it's on the next slide.

That's OK. She came up with a very interesting proposition for the end result of incorporating AI software into regular clinical practice. After coming to the conclusion that doctors will ultimately bear the blame for mistakes being made, she predicts that will lead to defensive medicine. So, I'm going to do my best to read this pretty quickly for you guys. «Hospitals are replacing radiologists with artificial intelligence is too fanciful and futuristic. The more likely scenario is that AI will be used to help radiologists by flagging abnormalities. Radiologists will still be responsible for the final interpretation. AI will be to radiologists what Dr. Watson was to Sherlock Holmes – a trusted, albeit overzealous assistant.

Though Holmes often ignored Watson's advice, radiologists won't find it easy to dismiss artificial intelligence because they'll incur a new liability. The liability of disagreeing with AI. If AI flags a lung nodule on a chest radiograph that the radiologist doesn't see and that nodule is cancerous and the patient suffers because of a late diagnosis, the radiologist may be liable not just for missing the cancer, but for ignoring AI's advice.

A string of such lawsuits would make radiologists practice defensively. Eventually, they would stop disagreeing with AI because the legal costs in doing that would be too high. Radiologists will recommend more imaging, such as CT scans, to confirm AI's findings.
In other words, AI won't necessarily make medical care cheaper.»

OK, finally, our third option is more theoretical to us laypeople, but it's garnered considerable attention among computer scientists. So, I have an excerpt from an interview I did with Dr. Nicholas (Lasater). He's a Ph.D. in Applied Economics from MIT, and a professor of management at the University of Toronto. So, I think what I'll do is I'll share my screen because I have an MP4 and videos never work on PowerPoint, so. I'll just click on share content. Hmm. Oh, here it is. OK.

It's OK, Jake? It's working, right?
I think it's working, yes. Let's see this video.

(I agree) with the idea of making the program itself (liable) for errors and (brought) up the issue of (inaudible). Do you see a world where AI programs amass wealth, then they'll have to pay fines for the things they made?

To some extent. That's how some AI programs work, right? They are programmed to like rewards and dislike (inaudible). So that's how it all works in an Amazon warehouse, and so on. So there is a way to introduce in the program itself some sense of reward, or at least (inaudible). (From a) programming point of view, it's hard to believe that an algorithm gets rich, or something, and that (inaudible) (incentives) are for people, not for machines, or companies themselves, are...(chance) somehow. So, (nothing) (gets) sense, but there are ways to program that make (software) self-realize that they're making a mistake, and that it should maybe provide information about their mistakes, or these things, and so on. (inaudible) the algorithm is a way to go. Is it a question in a paradoxically less for (inaudible) and more for (inaudible), for instance? To what extent, in other words, it is false, is it possible to...(for a water)... I don't know.

I also feel like patients that are upset over a mistake in their care may not feel satisfied with (inaudible).
Exactly, (good point). Yes.
OK. And I'm (scared).
(Inaudible) is pretty good, Jake. Is it possible to just... (inaudible) keywords of what (has been said). It was OK to hear, but the (inaudible).

OK, (inaudible) or can Barbara put it back up on the screen because I don't have Raphael's slides after this. So Nico and I discussed whether it's a feasible (inaudible) AI program, whether programs can amass wealth, and then be forced to pay compensation if they ever conduct malpractice. We also discussed that while some programs (doing the ability) to understand rewards and punishments, ultimately, it's not possible to give an AI program the status of a person under the Income Tax Act, nor would it feel satisfying as a (inaudible) to know that an AI program is punished for its mistake in your care. So finally, after considering all three parties for blame, it seems likely that society will upset the status quo and physicians will continue to carry the responsibility for patient care. It's therefore up to them to only use safe products that they understand and can trust. It then must be become the burden of the manufacturers to prove to physicians their products meet that criteria. And I believe the first step in this process is for governments to create straightforward regulations for manufacturers to follow. Chief among those regulations should be to make programs as transparent as possible with regards to what metrics the program is trying to maximize, such as accuracy, and minimize, such as privacy breaches and racial discrimination. Transparency is important because it will allow doctors and patients to better understand how the AI program can improve their individual care, which leads to quicker adoption. The rate of adoption is important because once AI is able to improve medical care, the longer we wait to adopt its use because of regulatory delays, and questions like who is to blame, the more potential lives are otherwise lost. And that's my section. Thank you. Raph can take over.

We are very sorry, Raphael, but maybe you can (open) the slides and maybe Jake or Barbara can describe (them) because it's totally impossible to understand you. Very sorry, there is a problem. Maybe Jake or Barbara can help... [...]
Cela va laisser du temps à nos invités pour préparer leurs commentaires. It will give time to our guests to prepare their comments for the second part, from four to five. If Raphael cannot connect, maybe Jake and Barbara will try to explain.

Barbara: His part was about the importance of the way you perceive yourself. So, it was more about the perception of the medical staff. Because everyone in the medical staff perceives themselves in a certain way, depending on (whether) they're a medical doctor, if they're (inaudible), depending on their role, and (how they are) also perceived by anyone, depending on this role. And he worked on how the new technologies, and mostly AI. It would be a new part of the medical staff – kind of what Jake said – and would have an impact on how the doctor trusts himself and (how) he is (perceived). So that was the big part of the idea.

OK.
I really couldn't honor his work, I think.
Maybe you can (reach) a kind of conclusion, and then we'll try to connect later.

Yes.
Tu peux lire les diapos, peut-être ?
On peut les lire.

So his first slide was about the importance of the way you perceive yourself. So, as I said, the way you can see yourself will affect the way you will trust yourself in taking care of others. Sartre develops: «The way you will perceive yourself comes from the action of others to yourself, and from their emotions», and how it impacts the relation to (what's) diagnosis, medication, and follow-up. We'll see (that) after. So how is AI going to have an impact on all of this? Since AI is not an emotional subject, we don't consider AI to have emotions or to have... We don't (always) consider this, but they can be given human characteristics like he says: genderlike or having respect for others. So, if AI we work with, in the medical field, has an assigned gender or is respectful of the doctor, (for instance), this could impact the way that the doctor (feels) (important). And in the end, what is important is to really (remember) that a human is no robot, (that's what he wrote), human isn't robot, and robot isn't human. So, there's going to be different interactions and different trust placed in each of these parts of the medical staff. So overall, we saw that communication was bound to (change) with the development of new technologies and also the way medicine is done with the newest technologies and artificial intelligence, and that we need to have some tools that could be taught in (college) or tools on who's responsible for anything that happens now that we have those very new tools we don't always know how to use, and what trust will we place in the robots and how they will weigh in the balance of health workers roles. Yes, that's it. Thank you.

Merci à vous ! (suite des commentaires page 12)

4. L'usage de l'Intelligence Artificielle dans le champ de la gériatrie.

So we are waiting for the fourth group: Rahul, Estela, Margot, Radamis is with us, and Pauline.
OK. There are two problems I will present. We have the problem of the pandemic situation that leads to the isolation of people at home. They are lonelier. And we have a growing aging population. So we know, for example, that (23%) of the (Canadian) population will be elderly in 2030. So maybe, to (fix) this problem, we can use more artificial intelligence, and we know that (its) use is increasing in medicine (inaudible). Can you change, Rahul? OK. So here we have an (older person), and it's complicated for them to live alone at home. And yes, I think the control is better. So, I can't change the slide.

Who's changing?
I tried but I can't. It's very slow.
OK, so our research question is: «How can artificial intelligence be used in the care of older populations to address the health needs, social needs, and day-to-day functioning?

Hello. OK. So I'll be talking a little bit about addressing the health needs of the older population using AI. We have a little series of images created by Estela, just showing one of the characters from a movie and AI, and how they interact with an older person in their home. So, the problem here is that the person isn't able to keep up living their life alone because of their health needs. Through research, we've seen that 90% of the older adults in Canada do live with chronic conditions, and these require very good health care management and rigorous support to ensure that they are stable. And in France, it's seen that one in three seniors lives alone. And in Canada, that's similar because 92% of seniors live in a private home. So, they don't always have relatives or caretakers to provide for them. In one French study, it was seen that with these growing demands from the aging population, there will definitely be a higher cost and higher demand on the health care system. So there needs to be something, some solution to address this increasing demand and increasing costs. And so, we've seen that AI can be one of these options. I was able to manage a quick personal interview with one of my relatives who works in medical informatics. And this was some of their insight about AI.

They were showing that it's already being used in health care for something called predictive analytics. So it's used to predict healing and the outcomes of patients, whether that be in internal care or geriatrics. And specifically, he was able to talk about its use in wound healing by determining size and color and sepsis prediction. And so, he later talked about how this could be implemented in geriatric populations. This is just a little image presenting how the AI could be used to monitor and ensure the health of an elderly person at home. So, three options in which we can use AI, to ensure the health of the older population, (are) through home telemonitoring. This is the automated process of transmitting patient health care data from the home to the health care provider. So, that includes stuff like weight, blood pressure, blood glucose levels, etc. And this is shown to decrease the mortality and emergency care rates for older populations. Specifically, one study showed that there was a decreased 180-day of heart failure rate, and there was a decrease in general mortality, in addition to a decreased 180-day emergency department visits. So over 180 days, they were visiting the emergency department less, and there were less likely to be admitted for heart failure into the hospital and have higher mortality because of the home telemonitoring. It's also shown (inaudible) to create a smart home that allows for things such as fall detection. It can monitor and classify the activity of a person at home to ensure that by using bed sensors, heart rate sensors, it can sense how utilities such as water and everything is being used at home, to make sure that they're being healthy, and their patterns are not abnormal, to see if they've had any health care emergencies.

And finally, we can also use AI at home for early diagnostics. So, in one study, it was seen that Bluetooth monitoring systems at home were able to sense the behaviors and predict patterns of movement that could indicate an earlier Alzheimer's diagnosis. And that used location and movement patterns. And all of these can be augmented through the use of AI apps to improve and create more sophisticated algorithms to help the monitoring systems. And so, through the interview – in one of the quotes –, he was talking about how we can use these sensors to allow the AI to detect changes, and allow the AI to engage (inaudible) and get help earlier on. Some of the consequences of using AI. We just wanted to explore both the benefits and the downfalls. One study talked about the four Ds specifically: depersonalization, discrimination, dehumanization, and disciplination. So, it discussed how AI can decrease the individual illness experience, and it can cause the patient to be seen as their health issue rather than a multifaceted human. So it doesn't really allow for the holistic provision of care because it's limiting the humanistic ability to integrate individual experiences into the provision of care. It can lead to discrimination due to ethics and age generalizations based off of some of the stuff we've talked about before, such as the limited use of data in marginalized populations, whether that be ethnic or age-related. It can also lead to dehumanization, which kind of talks about the datafication of patients and how human contact can be lost in this provision of health care. So, it's mainly provided by an algorithm and a system, and they don't really get face-to-face contact with a provider as much for their health needs. And disciplination which kind of talks about the surveillance and monitoring of a person's activity. And if they diverge from this activity, they are disciplined, and they're forced to do certain things to maintain their health. But this can be seen as an intrusion of privacy and deviations in behavior can... which lead to intervention can be seen as hyper monitoring the person's activity. And then, these are just some solutions to address these concerns. For example, ensure that they're voluntarily engaging with this technology, that we have more research from marginalized populations, that we're looking into the acceptance rates of AI with older adults, and we only give this AI to those who need it rather than giving it to everyone.
I will talk about the social issues of the aging population. One of the worse problems of the aging population is loneliness. We know that if the family comes to visit them a lot, the health professionals don't have enough time to spend with them. And sometimes they could be excluded from society because they have dementia, because they are in retirement homes, for example. So, loneliness is a big problem because there are lots of consequences: depression, anxiety, dementia, increased mortality, increased medication use. And we know that social distancing is negative to health or mental health, and hinders the ability to socially engage. It is a very paradoxical situation with Covid-19 because we stay home to protect ourselves from the virus, but it's not so good for our mental health. And the aging population doesn't have this familiarity with new technology. It is difficult for them to communicate with their relatives with phones and tablets. It's complicated for them to understand that. Maybe artificial intelligence could be a solution for that. And we have... first, yes. The person that (was) interviewed said that AI can act as an older person's safety net, their first source of contact for their concerns. There is even AI that can detect emotions, and they could probably (act back through transference). So, I found two (main) solutions to resolve (this), to resolve communication with the family, for example.

So, we have voice-based virtual assistants, like Amazon Echo, Google Home. It is a very (good) mental stimulation for conversation. It's very important for these people to (talk) every day, to stimulate the brain, and also have a feeling of safety. For example, (when the person can't reach) the phone, the person can ask Google Home: «Please call my son or call emergency». So it can be very (hopeful) (inaudible). And there are virtual companions. I saw a robotic animal called Jennie. It's a robotic dog, and it (brings) fun to older people in retirement homes. And it's also keeping older adults active. For example, the robot could say: « Dance with me, I will sing». And it keeps them connected to their family. These solutions have limits. First of all, robots are no substitute for a real relationship. As Raphael wrote, I think; The robot isn't human. So we need tact and compassion. We need smiles. Yes, it's very important. We have to see our family. It's not enough to live with Google Home. And it's also difficult for some older people to accept new technologies, to accept robots. They (are unfamiliar with it), so maybe (through) the design of the robot, we can make them (friendly without being too pricey). And I think the main problem is the cost and the ecological impact of this technology. It leads to inequalities, due to the cost and the access to energy. And maybe robots are not a priority in elderly care. That's it. I think it is Estela's turn to speak.

OK. Estela is talking, right? The time is already 4:00. (Inaudible) (three) minutes. Estela, if you could make it short, it'd be nice.

It should be a little easier to keep it short because as you can understand, day-to-day life is tied with social and health problems. So, it's a little redundant with what my colleagues said. What's really important in the day-to-day life aspect, is that something simple and evident to us can be very difficult, very tiring, for elderly people. A daily task, if you are physically or mentally impaired, can be very tiring and can (take all) day. So the lack of independence and problems can lead you to slowly deteriorate. When it includes loss of memory, you can forget your medication, your appointments, your obligations, and face a lot of trouble. Artificial intelligence can help with this problem. I compared two artificial intelligent (devices): Amazon Echo, there was a study of how older people used Amazon Echo, and another device, which is (a pro tech) ElliQ, and it's specially designed to help older people. On the website of ElliQ, you can talk to her. So, I had a little chat with her. I don't think she understood what I was doing, but she gave me information about herself. So, (some of the) tasks that older people have to do is maintain their home. AI can help with that. Maybe, if the person is physically impaired, it can activate the light, the blinds, the fans. And sometimes it can also help create a routine, like maybe open the blinds in the morning so that a person wakes up at a normal hour, and goes to bed at a normal hour. It can give reminders to older people: medication, (inaudible) water, or their daily routine, like maybe: «It's time to get lunch», or maybe «It's time to go to bed». And answer questions. A feeling that was prevalent in the review of Amazon Echo was that caregivers can get a little irritated when patients, especially with dementia or memory troubles, ask the same question again and again just because they forget. A robot won't get impatient. It does not feel impatience. So, the review felt like it relieved them of the feeling of guilt, and of (being burdensome) to the caregiver. They can also arrange (external) interaction, maybe a cab to go visit someone. It can inform about social media, the way the news would do, so that people keep a connection with the outside world. The robot was designed (using beta testing) (base), which had this important distinction (between) a reactive AI and a proactive AI that takes initiative and proposes things like: «Today was the first day of school. Maybe you want to call your grandchildren, to know how it's going.» To propose things, to take initiative, and to monitor the patients so that when something happens, caregivers can be contacted. The problem may be the difficulty to implement (this). A complaint with the Echo and Amazon was that people with speech impairments (inaudible) to understand and (inaudible) every time. In case of (inaudible), the safety of (inaudible), one of the most fragile parts of the population, who will deal with the (malfunction)? How can we prevent it? And who will get (inaudible)? If there are memos and notes, who will know what my grandmother is doing at what time and what medications she takes, etc? It could be difficult to implement because of the cost of the health care system, so we have to design a health care system that can (absorb these) costs.

Thanks, Estela. It's maybe time to conclude.

So, I think we're just going to conclude up. We talked about whether AI should or shouldn't be used in the field or not. And in my interview, we talked about how if it is shown to be better than what we currently can provide for an older population, it will become the standard of care, but it's the matter of actually proving that difference. And AI may not have been able to prove that difference in studies right now, so we need to do continuous research to see if it is providing benefits, whether that be clinical or cost-saving, and also to consider whether we'll be able to access these technologies equally for all people.

Thank you, Estela, Rahul.

5. L'intelligence artificielle en médecine: catalyseur ou remède des disparités sociales.

We'll continue with the third presentation with Océane, Oliver and Shabana, with Francis Bakewell as tutor. Océane, Oliver, are you ready ? Yeah, we're ready. I'm just going to share my screen.

OK, thank you. Can everybody see the screen? OK, perfect. So our our project is titled Artificial Intelligence in Medicine, Catalyst or Mender of Social Disparities. So what we did here was, we basically put our presentation in the context of what's going on right now with the COVID 19 pandemic. And there's a growing evidence, and research evidence, that shows that the COVID 19 pandemic has really shown a lot of the pre-existing social and health disparities within Canada, France and globally as well. And its effect continues to propagate these inequities. So here are just a few research examples, but we're going to go through a couple of case examples in Canada and France as well. So just as a little background in Canada, in the province of Ontario, right now, there is one region called Windsor-Essex, and that's the only region within the province that remains in stage 2 of reopening. Everywhere else is in stage 3, and Windsor-Essex is not a very big city or region, it's not a big city like Toronto or Ottawa. So it points to the fact that there might be an issue going on here as to why our case is not as controlled as other parts of the province. And a lot of this has to do with the demographics. So I was actually quite surprised to know that there were actually a lot of undocumented migrant workers within the region, and a lot of the social inequities that exist within Ontario and Canada have made this region unable to open up more into stage 3. So in this article by CBC, it really documents how migrant workers are slipping through Ontario's COVID 19 net. For example, the biggest impediment there is that they don't have provincial health insurance coverage, so they assume that this type of testing is not available to them. With this mindset, there would be less testing. And also, it's been documented that many of these migrant workers don't want to get tested because of fear for deportation and so forth. So this has really propagated some social inequities that we see here, where they're not able to control the COVID 19 cases as much. In the bigger context of Canada, Toronto is the biggest Canadian city and social inequities are seen here as well. So in this Toronto Star news article, one of the phrases that caught my attention was: «The COVID 19 rates are more than 10 times higher in some of the neighbourhoods than in the least affected.» So these neighbourhoods are really the city's northwest and I have a lot of infographics to show after, but the COVID 19 rates are 10 times higher in neighbourhoods that have low socio economic status, and so forth. Here is the city of Toronto. I'm not sure if you can see my mouse, but right at the center over here, this is downtown Toronto. And then as you go further northwest and a bit northeast, there are higher cases of COVID per 100.000 population. So it's really the northwest areas of Toronto that we see a lot more cases. In the next few infographics, you'll see how that relates to social determinants of health. So here it's the percentage of occupations in manufacturing and utilities, and a lot of these jobs in manufacturing and utilities, you can't work from home, so you have to go into the office and so forth. That definitely contributes to the spread of COVID 19 in residents of these neighbourhoods. And here, it's a percentage of residents who identify as black. So more in the northwest and also the northeast. Here, the orange shows high primary care needs, where the blue shows low primary care needs. So this is already pre-existing, pre COVID 19. And the percentage of housing that's not suitable, so perhaps would be more high rises, more dense and so forth. So you can really see that the number of COVID 19 cases in Toronto is really related and interrelated to all of these other social determinants of health.

So these cases aren't isolated to Canada, it really is a global health issue because it affects other parts like every corner of the world, really, including France, especially the homeless population, but I'm going to let Océane talk a little bit more about the situation in France.

(Inaudible).
Here, there is an accumulation or risk factors, especially for immigrants and descendent populations.

Il y a un petit bug. Océane, pourriez-vous couper la caméra ? D'accord. N'hésitez à me dire si ça recommence. Ça a l'air mieux.

Je vais peut-être recommencer, du coup. In Seine Saint Denis, a neighbourhood near Paris, the capital of France, there is an accumulation of risk factors and descendant populations, who are really numerous in France. Can you show the next slide? You can see on this graphic that there are (lots) more dead in Seine Saint Denis than in Paris, when the COVID 19 was stronger in France. Can you put the (inaudible)? Thanks. These are some various reasons. At the same age, the declared state of health of immigrants is generally worse than that of native-born French citizens -you can change the slide, Oliver-, which appears to be closely linked to the precarious living conditions they face more often, but also to experiences of discrimination and racism, which are a factor in explaining inequalities. And also, the department of Seine Saint Denis, health care provision and the lesser recourse to care by precarious people in general and immigrants in particular are very likely to produce a particular worsening of the health crisis and its effects. There are a lot of factors that lead to this situation. I (inaudible) can go on.

The take home point is that COVID 19 did not cause these social and health inequities, but rather in our pre-COVID daily life, many of these inequities are rather invisible and not brought into light as much. So what COVID 19 and the global pandemic has done is it highlighted what exists every day». This is a quote by Dr. Eileen de Villa, Toronto's medical officer of Health. And basically, this is not isolated to Canada as well, so the mayor of Saint Denis also shares that the problem with this epidemic is that it underscores all the pre-existing inequalities. That was our little background, and we're going to get into a little bit of the artificial intelligence and how it relates to social disparities. So a bit of how AI is used. AI is used in our everyday life. Over here, you can see that it's involved in search predictions using data collected through all searches on Google. It's used in the judicial system, so in New York, they have an algorithm based on hundreds and thousands of data where it basically informs the judge like how likely a person who is on trial is to run away. And at the same time, also within our everyday life, cars are now using AI, there is self-driving cars. Although it may seem far in the future for us to see them on the road, a lot of cars currently use AI in different aspects like self-parking and environment scanning and so forth. So within medicine, there's definitely a lot of uses of AI, for example, the Framingham Heart Study, to predict risk of cardiovascular events. There is an interesting project done in the Philippines that maps dengue fever based on weather and land use patterns associated with transmission. I think that's quite interesting. And also, of course, skin imaging collaborations to detect melanoma and distinguishing between benign and malignant moles. And finally, one of the more interesting aspects of AI within medicine that I found was the use of signal processing. Here, it's basically a project that predicts asphyxia using a birth cry, recordings of children using mobile phones. It's especially in use, and I believe it's Africa where there is not necessarily a lot of health care accessibility in rural areas. So this would be a really good use of AI to detect health issues. The next part is just about challenges and bias inside and outside of AI.

We didn't hear, Oliver. Oh, it didn't play? Now it's better.

OK. I'm not sure if it'll actually play the sound, but it was basically asking what is one word to describe the challenges of AI in medicine. So how is that, implementation, systemic discrimination and systemic inequities. Oh, say on, you're muted.
(Inaudible) (It's my mic). So it's the voice of Shabana, she can't be here today, so I will (talk) in her place. So in AI, there are a lot of bias. One of the bias is inside the data. It refers to hysterical inequalities like racism that are intertwined within the training data that AI use to learn from.

The COMPAS algorithm was used by judges to determine whether defendants should be granted bail or not in the US. The AI machine was learning from data on arrest records where, because of existing structural racism, black males were arrested more frequently than their white counterparts. Just learning from the data, the AI machine started assigning higher risk score to defendants who are black and judges were more likely to prolong a bail hearing. This is one of the many examples of overrepresentation of certain populations into bias within the datasets. You can put the next slide, please. You have another type of bias. It is the underrepresentation. So. You can also have underrepresentation of marginalised groups, the commercially available skin recognition software (tells you) (bias) (inaudible) because of data was 75% male and 80% whites. So black women were most likely to be mistaken for men than white women. We. You can (inaudible) (please). There is also bias outside the data. We define bias outside the data as programs accessing (inequitable) datasets the AI can learn from. Most datasets are obtained through the collection of data points by surveys, social media or other forms of technology. (Inaudible) (must) marginalise in our society. We don't have a (inaudible) of available technology will not be (inaudible), therefore being excluding from data training sets. Further, many training datasets are not open access and researchers need internal or external funds to access the datasets. So AI itself generally won't introduce bias, it's the data. It's on the next slide. So it's one of the things that's Dr. Andre Carrington said to one of us (during the) interview. You can change the slide, and put the (second one).

You will have (inaudible) soon please, Océane and Oliver? Just for the time?

I will try to be a little... You can put... Slide 30, maybe (inaudible). Go to (where) (AI) can reduce disparities (inaudible). So. A lot of works of research and roundtables are giving us advices to create an equitable AI by changing the way we develop them and use them. AI is an instrument like anything else, and it has a lot of potential for reducing the disparities we were talking about, because of easier access and patient engagement. We have new toolsets to reduce inequities. When the computer scientist and digital activist Joy Buolamwini said: «I'm optimistic that there is still time to shift towards building ethical and AI systems that respects our human dignity and rights». A lot of works of research and roundtables are giving us advices to create an equitable AI by changing the way we develop them and use them, and most of them are taking place in Canada and France. One more (popular) (of them) is the Montreal Declaration for Responsible Development. It is based on 10 principles. We can go to the next slide. The then principles are well-being, respect for autonomy, protection of privacy and intimacy, solidarity, democratic participation, equity, diversity inclusion, prudence, responsibility and sustainable developments. They are more detailed in the anterior declaration that you can sign online if you want, if you have some time, (if you are interested). Next, we have some quotes from a paper. Just (inaudible), that a responsible way to develop AI is achievable. It's not a dream, unachievable. The design teams need to be aware that biases exist and have various causes. They need to be always asking themselves if the work is equitable. One way to achieve this is to have inclusive teams, with a lot of different types of people, including marginalized people. You also need feedback from all the stakeholders and so the public people (inaudible) to find if there are some biases. You can go to the next slide please.

Thanks. It's 20 minutes, you have to conclude (inaudible). Thank you. OK. I will just say this slide, and if you want to say something after... So in order to be able to design a responsible AI, you need to ask yourself five questions: What will the automated decision do? How will potential bias be detected? What are the operators incentives? How are other stakeholders being engaged? And has diversity been considered in the design and execution?

Commentaire par Isabella Tomassi, Guillaume Lio, Bernard Andrieu et Francis Backewell :
We look at the time, we have 10 minutes before the end of this roundtable. Maybe Isabella, we start now with you...

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