FROM FRANKENSTEIN TO ASTRO BOY: HUMANS, AUTOMATION, AND WARFARE

Group Captain Jo Brick

Australian Defence College
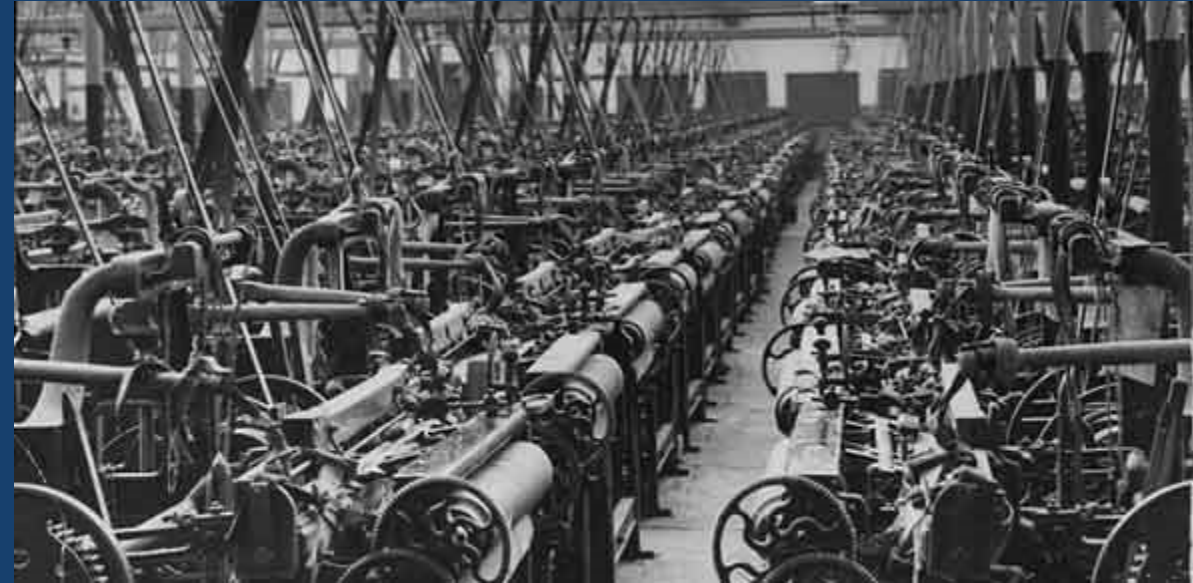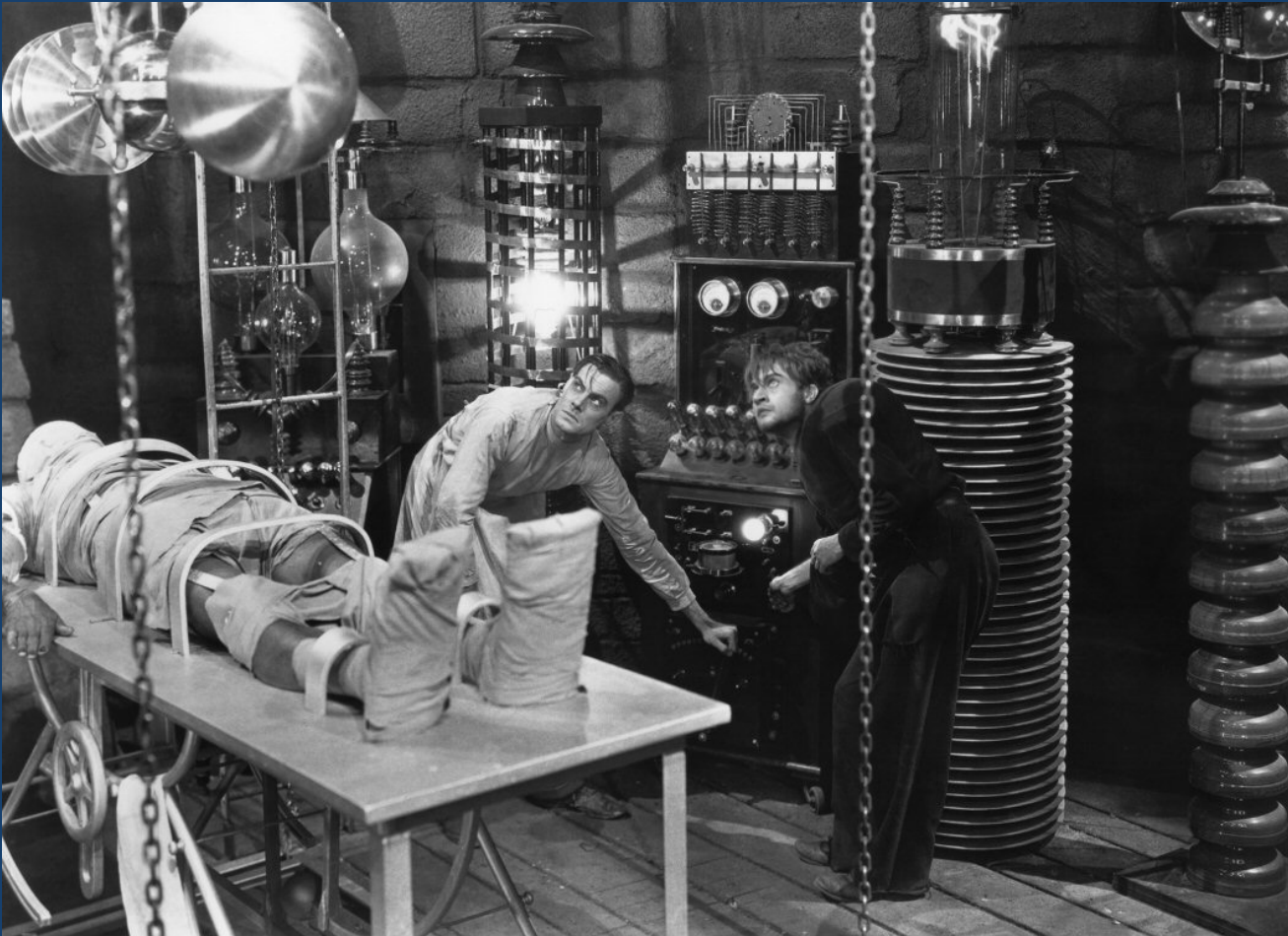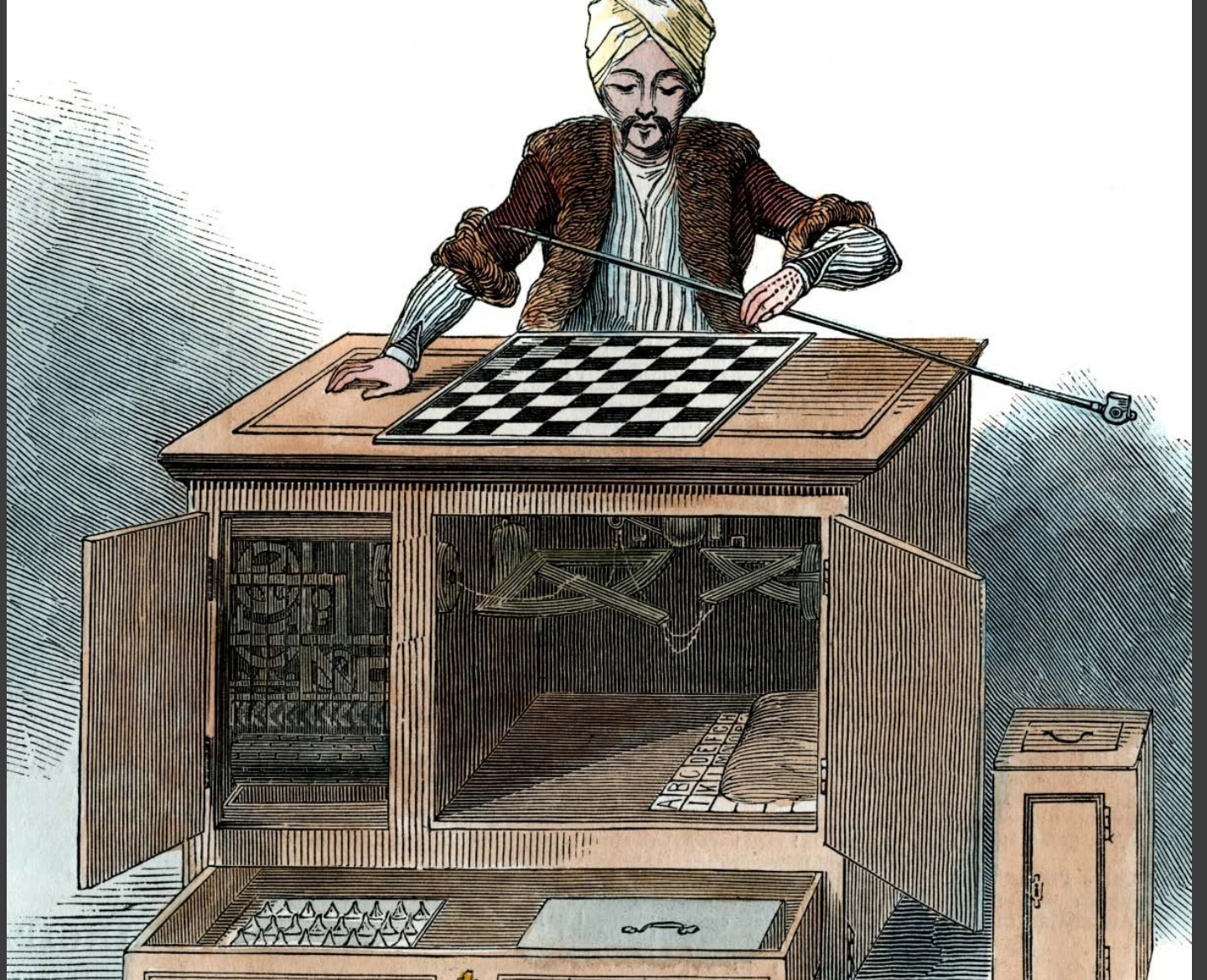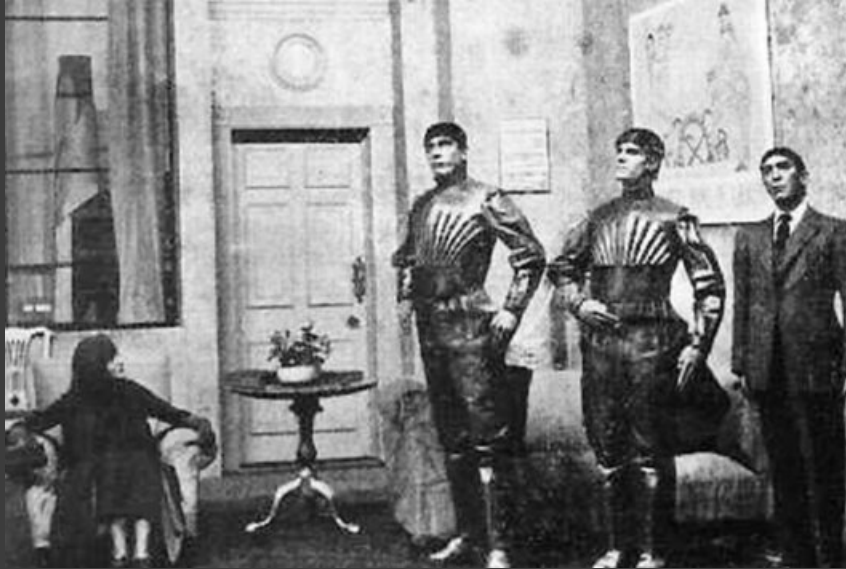
"… technology is the continuation of evolution by other means…."

Ray Kurzweil

The Age of Spiritual Machines

FRANKENSTEIN:
WARNINGS ABOUT TECHNOLOGY AND EVOLUTION

IRON MAN:
EXTENDING HUMAN ABILITY

ACTUALITÉS SCIENTIFIQUES ET INDUSTRIELLES

1053

CYBERNETICS

OR

CONTROL AND COMMUNICATION
IN THE ANIMAL AND THE MACHINE

BY

NORBERT WIENER

Professor of Mathematics at the Massachusetts Institute of Technology

Guest Investigator at the Instituto Nacional de Cardiologia de México.

PARIS

HERMANN & Cie. ÉDITEURS
6, Rue de la Sorbonne, 6

THE TECHNOLOGY PRESS   JOHN WILEY & Sons. Inc.
Cambridge, Mass.   440 Fourth Av., New York

1948

MECHANICAL BRAINS
WORKING IN METAL BOXES, COMPUTING DEVICES AIM GUNS AND BOMBS WITH INHUMAN ACCURACY

A great many of the best and busiest brains fighting this war do their work not in men's heads but in metal boxes. These are mechanical brains, the useful though prosaic counterparts of the comicstrip robots that go around with stovepipe joints on their legs and electric coils sticking out like hair on their steel heads. The boxed brains are computing devices which 1) take certain conditions into account, 2) go through some mechanical mathematics and 3) quickly give an answer which automatically aims a gun or directs an airplane or drops a bomb.

For a great many years the Sperry Gyroscope Co. of Brooklyn, N.Y. has been in the business of building mechanical brains and putting them up in metal containers. Today Sperry's business is as far-flung as the war itself. Sperry bombsights help drop bombs on our enemies. Sperry gyroscopes guide airplanes everywhere over the world. Sperry gunsights help knock enemy planes out of all the skies. Sperry control apparatus fires guns on land and sea.

One of the newer Sperry gadgets is the automatic gunsight which is used in U.S. bomber gun turrets. The way this sight and turret work is shown in the drawings on these pages. The gunner lines up his target with two vertical hairlines in the sight. The trick is to keep the enemy plane exactly framed within these lines, which are moved in or out by means of a range knob as the target approaches or recedes. As he follows the target in its course, the sight automatically makes deduc-

tions from this "tracking" process, which it translates into the relative course and speed of the target. Taking this data, the range data and other factors like the weight of .50-cal. bullets, the gears and levers and circuits that make up the mechanical brain arrive with inhuman speed at an answer. The answer is expressed at the critical moment when the gunner presses his triggers and fires his .50-cal. machine gun at a target. The gunner's accuracy is not 100%. But it is far higher than it ever has been before in the short-lived history of combat aviation.

Sperry's involvement in aerial war goes back to the very beginning of war planes. The history of its development of the precision bombsight is described in the series of drawings on pages 69-72.
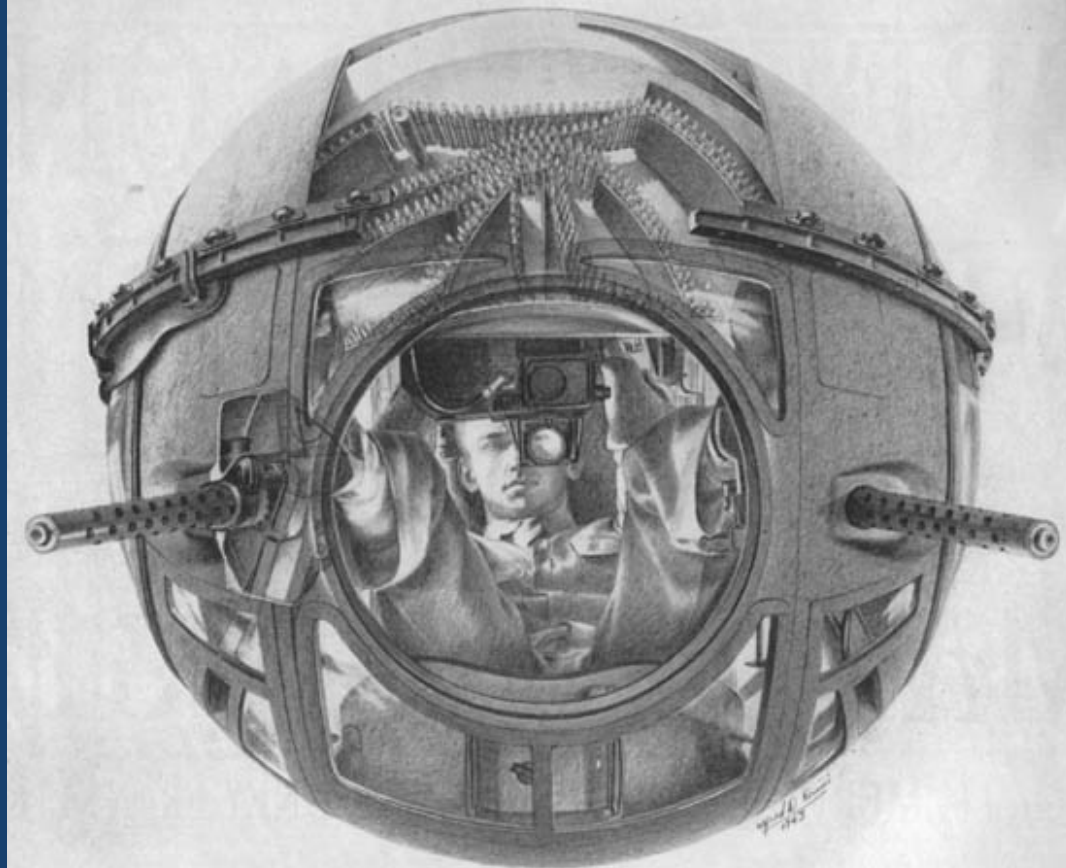
The ball turret underneath a big bomber operates on the same principles that govern the turret explained in detail on opposite page. Peering through his automatic computing sight, the gunner swings his turret horizontally in a complete circle and vertically from the position shown here, where guns are parallel to bottom of the plane, to position in which the guns point straight down. The bullets feed into .50-cal. guns through the system shown in cutaway part of the drawing. Electro-hydraulic mechanism of turret is made by Sperry.

ASTRO BOY: MACHINES BECOME HUMAN
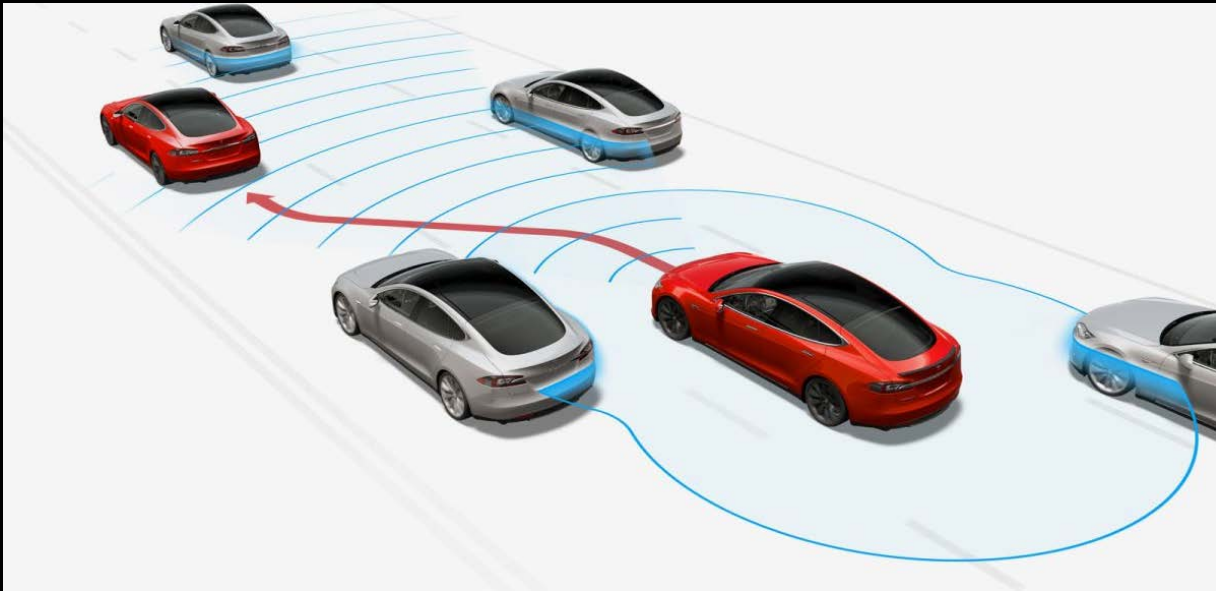
FURTHER QUESTIONS

- Do we trust the systems that we have created? Are we expecting them to be perfect, or to accept that they are flawed just like us?

- Do we understand autonomous systems enough to inform the creation of an effective system of accountability?

- How would autonomous and intelligent systems make decision, free from human intervention? Would they reflect the best of humanity or something less inspiring?

- Does the conduct of war by autonomous and intelligent systems dilute the sanctity of war as a societal function?

- Who or what is permitted fight wars and to take human life on behalf of the state?

- What does the use of AI and autonomous systems in warfare mean for the profession of arms?

"You don't need to be a technical expert to appreciate the possibilities and pitfalls of using data. You just have to know what it's like to be human."

Ellen Broad, *Made by Humans*