Lesson1_Q&A

1.3 Yes, they are rational, because slower, deliberative actions would tend to result in more damage to the hand. If "intelligent" means "applying knowledge" or "using thought and reasoning" then it does not require intelligence to make a reflex action.

1.8 Presumably the brain has evolved so as to carry out this operations on visual images, but the mechanism is only accessible for one particular purpose in this particular cognitive task of image processing. Until about two centuries ago there was no advantage in people (or animals) being able to compute the convolution of a Gaussian for any other purpose. The really interesting question here is what we mean by saying that the "actual person" can do something. The person can see, but he cannot compute the convolution of a Gaussian; but computing that convolution is part of seeing. This is beyond the scope of this solution manual.

1.14

a. (ping-pong) A reasonable level of proficiency was achieved by Andersson's robot (Andersson, 1988).

b. (driving in Cairo) No. Although there has been a lot of progress in automated driving,

all such systems currently rely on certain relatively constant clues: that the road has

shoulders and a center line, that the car ahead will travel a predictable course, that cars

will keep to their side of the road, and so on. Some lane changes and turns can be made

on clearly marked roads in light to moderate traffic. Driving in downtown Cairo is too

unpredictable for any of these to work.

c. (driving in Victorville, California) Yes, to some extent, as demonstrated in DARPA's

Urban Challenge. Some of the vehicles managed to negotiate streets, intersections,

well-behaved traffic, and well-behaved pedestrians in good visual conditions.

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d. (shopping at the market) No. No robot can currently put together the tasks of moving in

a crowded environment, using vision to identify a wide variety of objects, and grasping

the objects (including squishable vegetables) without damaging them. The component

pieces are nearly able to handle the individual tasks, but it would take a major integration effort to put it all together.

e. (shopping on the web) Yes. Software robots are capable of handling such tasks, particularly if the design of the web grocery shopping site does not change radically over

time.

f. (bridge) Yes. Programs such as GIB now play at a solid level.

g. (theorem proving) Yes. For example, the proof of Robbins algebra described on page

h. (funny story) No. While some computer-generated prose and poetry is hysterically funny, this is invariably unintentional, except in the case of programs that echo back prose that they have memorized.

i. (legal advice) Yes, in some cases. AI has a long history of research into applications of automated legal reasoning. Two outstanding examples are the Prolog-based expert systems used in the UK to guide members of the public in dealing with the intricacies of the social security and nationality laws. The social security system is said to have saved the UK government approximately $150 million in its first year of operation. However, extension into more complex areas such as contract law awaits a satisfactory encoding of the vast web of common-sense knowledge pertaining to commercial transactions and agreement and business practices.

j. (translation) Yes. In a limited way, this is already being done.

k. (surgery) Yes. Robots are increasingly being used for surgery, although always under the command of a doctor. Robotic skills demonstrated at superhuman levels include drilling holes in bone to insert artificial joints, suturing, and knot-tying. They are not yet capable of planning and carrying out a complex operation autonomously from start to finish.