## David J. Gunkel

# An Introduction to Communication and Artificial Intelligence



# An Introduction to Communication and Artificial Intelligence

David J. Gunkel

Copyright © David J. Gunkel 2020

The right of David J. Gunkel to be identified as Author of this Work has been asserted in accordance with the UK Copyright, Designs and Patents Act 1988.

First published in 2020 by Polity Press

Polity Press 65 Bridge Street Cambridge CB2 1UR, UK

Polity Press 101 Station Landing Suite 300 Medford, MA 02155, USA

All rights reserved. Except for the quotation of short passages for the purpose of criticism and review, no part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publisher.

ISBN-13: 978-1-5095-3316-9 ISBN-13: 978-1-5095-3317-6(pb)

A catalogue record for this book is available from the British Library.

Library of Congress Cataloging-in-Publication Data

Names: Gunkel, David J., author.

Title: An introduction to communication and artificial intelligence / David J. Gunkel.

Description: Medford, MA: Polity Press, 2019. | Includes bibliographical references and index. |

Identifiers: LCCN 2019011785 (print) | LCCN 2019017010 (ebook) | ISBN 9781509533190 (Epub) | ISBN 9781509533169 (hardback) | ISBN 9781509533176 (pbk.)

Subjects: LCSH: Computational intelligence. | Natural language processing (Computer science)

Classification: LCC Q335 (ebook) | LCC Q335 .G86 2019 (print) | DDC 003/.5--dc23

LC record available at https://lccn.loc.gov/2019011785

Typeset in 10.5 on 12 pt Plantin by Servis Filmsetting Ltd, Stockport, Cheshire Printed and bound in Great Britain by TJ International Limited

The publisher has used its best endeavours to ensure that the URLs for external websites referred to in this book are correct and active at the time of going to press. However, the publisher has no responsibility for the websites and can make no guarantee that a site will remain live or that the content is or will remain appropriate.

Every effort has been made to trace all copyright holders, but if any have been overlooked the publisher will be pleased to include any necessary credits in any subsequent reprint or edition.

For further information on Polity, visit our website: politybooks.com

### Brief Contents

	Preface Figures	ix xiii
1 2 3		3 31 61
5	Part II: Applications  Machine Translation  Natural Language Processing  Computational Creativity  Social Robots	97 135 165 199
	Part III: Impact and Consequences Social Issues Social Responsibility and Ethics	231 256
	Part IV: Maker Exercises  Exercise 1: Demystifying ELIZA Exercise 2: Algorithms Exercise 3: Machine Translation Exercise 4: Chatbot and Quasi-Loebner Prize Exercise 5: Template NLG	287 294 304 310 318

# **Detailed Contents**

	Preface Figures Abbreviations	xiii xvii
	Part I: Introduction and Orientation	
1	Introduction	3
•	1.1 Artificial Intelligence	4
	1.2 Robot	12
	1.3 Why Words Matter	14
	1.4 Overview of the Book	20
2	Communication and Al	31
	2.1 Communication and Machine Intelligence	32
	2.2 Machine Intelligence and Communication Studies	44
	2.3 Paradigm Shift	56
	2.4 Conclusion/Summary	59
3	Basic Concepts and Terminology	61
•	3.1 Algorithm	62
	3.2 Competing Methods	68
	3.3 How Things Work	75
	3.4 A Pair of Terminological Pairs	88
	o de la companya del companya de la companya del companya de la co	

F 1 11		-		
Detail	ed	Con	ten	

vii

#### Part II: Applications

4	Machine Translation 4.1 Historical Context 4.2 Machine Translation: Techniques and Technologies 4.3 Return to Babel	97 98 109 131
5	Natural Language Processing 5.1 Chatbots 5.2 Spoken Dialogue Systems 5.3 NLP and Communication Studies 5.4 Limitations and Future Opportunities	135 136 142 154 161
6	Computational Creativity 6.1 Games 6.2 Natural Language Generation 6.3 Recombinant Art 6.4 Other Approaches and Innovations 6.5 But Is It Art?	165 166 174 184 191 193
7	Social Robots 7.1 Social Robots 7.2 Embodiment and Morphology 7.3 Technology and Technique 7.4 Outcomes, Consequences, and Repercussions	199 200 206 213 219
	Part III: Impact and Consequences	
8	Social Issues 8.1 Technological Unemployment 8.2 Gainfully Unemployed 8.3 DIY Futures 8.4 Technological Displacement	231 232 242 248 253
9	Social Responsibility and Ethics 9.1 Responsibility 9.2 Technology Beyond Instrumentalism 9.3 Responses to Responsibility Gaps 9.4 Duty Now and For the Future	256 257 263 270 280

#### **Detailed Contents**

#### Part IV: Maker Exercises

Pait 14. Allens	285
Introduction	287
Exercise 1: Demystifying ELIZA	294
Exercise 2: Algorithms	304
Exercise 3: Machine Translation	310
Exercise 4: Chatbot and Quasi-Loebner Prize Exercise 5: Template NLG	318
	325
Notes	330
References Index	353

bayottments yhehita) 280

"The interface of today will be gone tomorrow. Read this book to learn how humans will be communicating in the future, and to understand how the limits of our imaginations restrict the possibilities of being. A timely read, written in an engaging, immediate, and prescient manner."

Zizi A. Papacharissi, University of Illinois at Chicago

"Understanding communication today without considering artificial intelligence would be like trying to understand mass media fifty years ago without considering television. Fortunately, David Gunkel's text provides the perfect foundation from which students and scholars can examine the state of contemporary communication. Al is pervading (some may say *invading*) human activities; understanding what it is, where it has come from, and its key debates is necessary if we are to know its consequences. Gunkel's book is the perfect starting point." Steve Jones, University of Illinois

Communication and artificial intelligence (AI) are closely related. Communication – particularly interpersonal conversational interaction – provides AI with its defining test case and experimental evidence. Likewise, recent developments in AI introduce new challenges and opportunities for Communication Studies. Technologies such as machine translation of human languages, spoken dialogue systems like Siri, algorithms capable of producing publishable journalistic content, and social robots are all designed to communicate with users in a human-like way.

This timely and original textbook provides educators and students with a muchneeded resource, connecting the dots between the science of AI and the discipline of Communication Studies. Clearly outlining the topic's scope, content, and future, the text introduces key issues and debates, highlighting the importance and relevance of AI to contemporary communication. In lively and accessible prose, David Gunkel provides a new generation with the information, knowledge, and skills necessary for working and living in a world where social interaction is no longer restricted to humans.

The first work of its kind, An Introduction to Communication and Artificial Intelligence is the go-to textbook for students and scholars getting to grips with this crucial interdisciplinary topic.

David J. Gunkel is Professor of Media Studies at Northern Illinois University.

Cover illustration: kirstypargeter/iStock

polity politybooks.com

