FROM COORDINATION TO CONTENT

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1. The Picture From Frege

The picture of attitude states and reports bequeathed to us by Frege (1892) includes a notion of shareable semantic content that is more fine-grained than reference. Frege called it sense, and claimed that the utterances and cognitive states of different agents might possess it in common. For example, my utterance of ‘Hesperus is visible in the evening sky’ expresses the content of a belief that you and I share. On the other hand, my utterance of ‘Phosphorus is visible in the evening sky’ expresses a different content, one we might fail to believe, even though the names ‘Hesperus’ and ‘Phosphorus’ actually corefer.

On the Fregean picture, an attitude report, such as ‘Endicott believes that Hesperus is visible in the evening sky’, states that the subject of the report (Endicott) is in an attitude state with a particular content. The content of the state is specified by the subordinate clause of the report (‘Hesperus is visible in the evening sky’). Indeed, we arrive at a particularly neat compositional semantics if we take the content attributed by the report to be the semantic content of its subordinate clause.

Frege did not recognize the de re reading of noun phrases in attitude reports. Fortunately, Kaplan (1968) provides the necessary extension of the Fregean picture to accommodate this reading, relying on Frege’s dictum that content determines reference. According to Kaplan, the report ‘Endicott believes Phosphorus is visible in the evening’, with ‘Phosphorus’ read de re, is true just in case there is some content \( \kappa \), where (i) the referent determined by \( \kappa \) is the planet Venus (i.e. the referent of ‘Phosphorus’), such that (ii) Endicott has a belief with the content that results from combining the content of ‘is visible in the evening’ with \( \kappa \). The sense of the name ‘Hesperus’, for example, could serve for \( \kappa \) in both conditions.

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The one thing missing from the Fregean picture is a detailed account of shared content. Specifically, what is the relation \( R \), more demanding than coreference, that a pair of attitude states or utterances must stand in for them to match in content? Frege himself had descrip-
tivist leanings on this question. However, sharing a descriptive mode of presentation is neither sufficient nor necessary for sharing content, judging by our ordinary practices of attribution (Edelberg 1986). Without a detailed answer to this question, we lack a testable account of attitude reports. Worse still, it might be raised in objection to Frege that the two properties of his notion of content – shareability and fineness of grain – are in tension. Perhaps the granularity of content satisfactory for modelling an individual agent’s psychology is small enough to rule out sharing across agents.

We turn next to an argument that seems to point to this conclusion. For any intersubjective relation $R$ you choose, its conclusion portends, a case can be constructed with the same features as the one that caused Frege to give up coreference as the criterion of content identity.

2. Kripke’s Puzzle About Belief

The step from reference to a more fine-grained notion of content is motivated by the following sort of case, first introduced by Frege. It could be that (1-a) is true while (1-b) is false.

(1)  
  a. Endicott believes that Hesperus is visible in the evening.  
  b. Endicott believes that Phosphorus is visible in the evening.

While ‘Hesperus’ and ‘Phosphorus’ corefer, they don’t make identical contributions to the reports above, since the reports are otherwise the same yet can possibly differ in truth-value.

Kripke, in his (1979) puzzle about belief, constructs a case along similar lines, but in the dialectical guise of a powerful challenge to the Fregean picture. A “Frege case,” in the general sense, is any counterexample to an account of content with the following structure. It consists of a pair of possible beliefs that are metaphysically independent (the agent could have one without having the other), but which the account in question must treat as identical in content. The original Frege case (1) is a counterexample to the theory that identifies content with reference (on which the same-content relation is just coreference). It motivates Freges finer-grained semantic category of sense. Constructing a Frege case for a given fine-grained account of content thus saps the motivation for preferring it to the referential view. If a Frege case could be constructed for any way of filling in the same-content relation, then the Fregean picture itself would be undermined. Every finer-grained candidate for content would be subject to the same criticism Frege relied on to rule out reference.

In setting up his case, Kripke adopts a target same-content relation. He finds it initially plausible to think that an agent has a belief with the same fine-grained content as a sentence $S$ if the linguistically proficient agent would sincerely assent to $S$. Since a proficient agent might consent to ‘Hesperus is visible’, while withholding consent from ‘Phosphorus is visible’, Kripke’s principle can accommodate the apparent fact that (1-a) and (1-b) differ in truth-value; each reports a belief whose content is sincerely expressed by a different sentence. The account is incomplete, in that it doesn’t yield a comparison of every pair of contentful states (in particular, it remains silent on sentences the agent would not assent to), yet it is complete enough to admit a Frege case.

The famous Pole, Ignacy Jan Paderewski, was both an accomplished musician and a successful politician. Suppose a certain Peter learned about Paderewski in two different settings, and, as a result, thought there were two different men, Paderewski “the musician” and Paderewski “the politician.” With this background in mind, we can distinguish two beliefs Peter might have:

(2)  
  a. Peter thinks that Paderewski (“the musician”) is an accomplished musician.

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1. As per Kripke’s weak disquotation principle (1979: 248–49). Kripke proposes that the belief report with individual $A$ as subject and expression $S$ as subordinate clause is true if $A$, a proficient speaker, would sincerely assent to $S$. If, as on the Fregean picture, a belief report with $A$ as subject and $S$ as the subordinate clause is true iff $A$ has a belief with the content expressed by $S$, weak disquotation implies that $A$ has a belief with the content of $S$ if $A$, a proficient speaker, would sincerely assent to $S$. 

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b. Peter thinks that Paderewski (“the politician”) is an accomplished musician.

According to the account of fine-grained content Kripke assumes, the beliefs reported above have the same content as the sentence ‘Paderewski is an accomplished musician’, since possession of either (2-a) or (2-b) would incline Peter to assent, sincerely, to that sentence. But if both beliefs have the same content as a certain English sentence, then both have the same content. Peter’s situation therefore counts as a Frege case for this conception of content.

Indeed, the very same situation counts as a Frege case for other fine-grained theories of content that have been proposed. Take, for example, the notion of content based on “causal-historical” relations between idiolectal words. Suppose a belief I would express with a sentence S in my idiolect and a belief you would express with S’ in your idiolect have the same content just in case S and S’ do. This in turn is true, on the causal-historical account, just in case S and S’ are causal cognates (this means that each word in S is causally related to the word occupying the corresponding position in S’, where two words are causally related just in case they have a common causal-historical

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2. Peter might simultaneously take two different attitudes towards the same sentence, even under (intuitively speaking) the same objective interpretation (“using ‘Paderewski’, as we usually do, to name the Polish musician and statesman”). If one of these attitudes is assent, I take this to be enough to satisfy Kripke’s condition (at least for present purposes).

3. The following view is similar to Devitt’s (1985). Kaplan (1990) adopts much the same approach to Frege’s puzzle, but takes these historical relations to mark continuity between words (considered as “natural” abstracta), rather than as inscribing a fine-grained same-content relation. More recently, Fine (2007) takes causal-historical connections to comprise the intersubjective links in his “coordination” relation (not to be confused with coordination in game theory, or as it is used subsequently in this paper). Fine puts “coordination” to the same use as Devitt’s synonymy and Kaplan’s isonymy relations, but with the important difference that “coordination” is not an equivalence relation (and so cannot be used to define a notion of content or, for that matter, word).

4. See Donnellan 1972 and especially Kripke 1972 for the relevant notion of causal-historical relation.

5. An idiolect is the idiosyncratic language of an individual.

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The causal-historical account manages to distinguish the contents of certain corefering expressions (in particular, ‘Hesperus’ and ‘Phosphorus’, which are not etymologically related), but still admits Frege cases. In particular, the two names pronounced ‘Paderewski’ in Peter’s idiolect have a common causal-historical origin in the larger community, and hence carry the same content according to this account.

Though we don’t yet have a watertight argument against the Fregean picture, some commentators (Crimmins and Perry 1989: 39–53) have been willing to concede that any relation R inclusive enough to capture intuitive cases of intersubjectively shared content will also admit Frege cases. This concession amounts to a re-nunciation of Frege’s picture of attitude reports as I have presented it.

Those who give up on Fregean content may find consolation in an alternative picture of the way pairs like (1) and (2) present and distinguish belief states. I turn next to a consideration of this approach, which I then proceed to defend against a charge of oversophistication. In so doing, I must introduce some new materials to the account; but, as it turns out, these same materials also support a Fregean restoration. The rival account, like the Fregean, requires a certain relation R with the formal properties of a shared content relation admitting no Frege cases. Indeed, it makes the same empirical predictions as a Fregean semantics with this R as its same-content relation.

3. The Iconodules

Frege had hoped for a notion of shareable content fine-grained enough to distinguish any pair of independent beliefs. But even if his wish was in vain, and there turn out to be, for any notion of shareable content,

6. Note that Fine (2007) is able to claim that each of Peter’s names is “coordinated” with a particular name in another idiolect, while maintaining that neither is “coordinated” with the other. His relation of “coordination,” though based on causal-historical connections, avoids the counterexample by failing to be an equivalence relation.
distinct belief states (of the same agent) having the same content, the
practice of attitude reporting will emerge unscathed. Independent be-
lief states are numerically distinct, and must be distinguishable some-
how, even if not on the basis of their shareable content. In particular,
pairs of beliefs such as those described in (1) and (2), though they could
be understood as having the same content, might well differ in their
manner of mental representation.

This line of thought characterizes a broad consensus of views de-
veloped around 1990 by, among others, Mark Crimmins, Jerry Fodor,
John Perry, and Mark Richard. I call these theorists Iconodules (“fans of
representational medium (Fodor 1990). To make computational sense
of Peter’s cognitive state, we must treat him as having (at least) two
mental dossiers on Paderewski, one for each type of belief state. (2-a)
is true if Peter stores the condition of being a musician in one of these
dossiers, call it $P_1$, while (2-b) is true if he stores it in the other, call it
$P_2$. The Iconodule would face a counterexample analogous to a Frege
case if there could be independent states of belief that are represented
internally in the same way. However, the computational framework of
RTM rules out any functional difference between two states of bearing
the same computational relation to the same expression type, so the
package as a whole is proof against such counterexamples.

Iconodulism distinguishes itself from the Fregean picture so long as
there is no intersubjective “same-symbol” relation. Canonical ‘Dules
derse this plausible view. As Crimmins puts it, mental representa-
tions “are not shareable like theories or conceptions, but are agent-
bound like headaches” (1995: 465). If there were a non-empty intersub-
jective relation $R$ of syntactic identity between mental symbols, then
an unscrupulous Fregean could co-opt $R$ as an intersubjective same-
content relation; a “formal” account of content, as it were.

It is the primary tenet of Iconodulism that, in ordinary attitude
reports, speakers single out particular belief states by their representa-
tional features. This leads to a complication of the original Fregean

8. In presenting Iconodulism as a coherent position, I must skirt those points

disputed by its pundits and homogenize individual positions.
9. The discussion to follow assumes that their notion of content is referen-
tial (i.e. the same-content relation is coreference). Not all Iconodules use the
term ‘content’ this way, but the variation is chiefly in terminology rather than
substance.
10. For instance, storage in a certain sector of memory.
11. Like the literature, I sometimes think of these components as expressions
(and hence use the word ‘symbol’) and sometimes as repositories of informa-
tion (in which case I use the word ‘dossier’). The different idioms don’t pick
out exactly the same thing, but the symbols I will be talking about are matched
to a set of dossiers.
semantics, on which, if you recall, the subordinate clause of a report simply contributes its usual semantic content. For example, Crimmins and Perry must say that the dossier \( P_1 \) is an unarticulated constituent\(^1\) of the proposition expressed by (2-a).\(^1\)

The central Iconodule claim is controversial (see, for example, Braun 1998: 560-61). Those aware of Peter’s false belief in two Paderewskis would seem to be able to exchange reports in a manner that takes account of it, distinguishing his beliefs about Paderewski “the musician” from those about Paderewski “the politician.”\(^2\) However, controversy is aroused when this capability is theorized as a case of different reference. Do unsophisticated people without a representational theory of the mind (or sophisticated people with an alternative theory) really refer to or otherwise talk about Peter’s private mental dossiers when they make reports that distinguish between his two Paderewskis? I address this thorny issue in the next section.

Some difficulties remain for those who abandon the Fregean picture for Iconodulism. Brian Loar (1976) issues a challenge to the referential account of the content of communication, using a puzzle case just like Frege’s. If I say “Hesperus is visible in the evening,” but you take me to have made the more surprising claim that Phosphorus is visible in the evening,\(^1\) then intuitively speaking you have misunderstood me. How-

\(\text{ever, at the coarse level of the objects referred to, the content you take up matches the content I express (Hesperus = Phosphorus). And so, if content match is the benchmark of sound communication, the theorist who identifies intersubjective content with reference must conclude that we have communicated successfully. Loar’s case reveals an application for shared fine-grained content, the keystone of the Fregean picture, outside of attitude reports.}\)

Fortunately, while Iconodulism was intended as a replacement for the Fregean account of attitude reporting, those adopting it have the resources to meet Loar’s challenge too. Already committed to RTM, the Iconodule can offer a narration of the misunderstanding above at the representational level, as follows: while I was transmitting information from a specific dossier (my “Hesperus” dossier, or the dossier that I indicate using that name), you took it to be emanating from my “Phosphorus” dossier. Alternatively: I meant for you to update your “Hesperus” dossier (the dossier you update when you hear that name) with the information, but you entered it in your “Phosphorus” dossier instead.

The way I will put the new benchmark (proposed on behalf of the Iconodule) is that successful communication requires us to coordinate\(^1\) on a particular pair of internal representations (our “Hesperus” dossiers, say). Hence communication can fail, even though your interpretation matches mine in referential content. The Iconodule, who is committed to the claim that ordinary language sometimes (namely, in the subordinate clause of an attitude report) discriminates private dossiers, need only generalize the account to all linguistic contexts. Of course, this only makes the substantiation of the central Iconodule tenet more pressing.

There is the further question of the semantics of reports with plural or quantified subjects, or for cases of anaphora between attitude re-

\(^1\) That is, a component of the proposition expressed by the report that is not the semantic value of any part of the utterance.

\(^2\) “The general solution to the puzzles is to allow a condition on particular beliefs, over and above a content condition, to be part of the claim made. The version of this strategy we shall pursue here is to take this further condition always to be a specification of the notions that are supposed to be involved in the ascribed belief. We shall say that a notion that a belief report is about is an unarticulated constituent of the content of the report—it is a propositional constituent that is not explicitly mentioned.” (Crimmins and Perry 1989: 697)

\(^1\) In the sense of choosing equilibrium strategies that target these representations in a coordination game (Lewis 1969; Schelling 1960). Coordination (which should be distinguished from Fine’s nontransitive semantic relation) will be explicated further in the next section.
ports.\textsuperscript{18} Both phenomena suggest a picture on which content is shared between agents.\textsuperscript{19} I will set such issues aside, however, as Iconodules can generally muddle their way through these cases.

4. Coordination

For Iconodules, \textit{de dicto} attitude reports are specific as to the representational form of the state reported on. Both (2-a) and (2-b) require, for their truth, that Peter have a belief about Paderewski, one that attributes to him the property of being an accomplished musician.\textsuperscript{20} But (2-a) additionally requires that Peter’s state represent Paderewski by the mental symbol \(P_1\), while (2-b) requires Paderewski to be represented by \(P_2\).

One familiar way the truth-value of an uttered sentence can depend on the disposition of a thing (such as a mental symbol) is if a component of the sentence refers to that thing. Let’s pause to consider the merits of \textit{referential Iconodulism}, according to which the truth-conditional dependency of, say, (2-a) on \(P_1\) arises from some component of the sentence referring to \(P_1\) (or else from \(P_1\) being an unarticulated constituent of the proposition expressed by (2-a)).

A sophisticated agent familiar with the Representational Theory of Mind could, of course, invent a name for another agent’s private symbol and proceed to refer to it by that name. Indeed, we have done just this for representations like \(P_1\) and my “Hesperus” dossier. Such expressions refer \textit{overtly} to private representations, but sophisticates could also devise some implicit means of achieving the same result. Crimmins (1992: 166) suggests the strategy of using a name \(N\) to tip off the hearer that the asserted proposition concerns the subject’s “\(N\)” dossier (i.e. the dossier the subject indicates using \(N\)).

It would be fanciful to attribute such overt and covert strategies to agents who do not countenance a category of mental symbols.\textsuperscript{21} The explicit coining of names for mental symbols is an unlikely occupation for such agents (as is the knowing adoption of a policy of implicit reference to symbols). Linguistic reference (as opposed to mental or perceptual reference)\textsuperscript{22} is conventional, and unsophisticated or defiant agents lack both the knowledge and the will\textsuperscript{23} to enter into an explicit convention to refer, explicitly or implicitly, to a mental symbol.\textsuperscript{24}

Fortunately, reference is only the most familiar route to truth-conditional dependency. In Kaplan’s (1989) baseline semantics, the truth-value of an utterance depends both on the proposition expressed (composed of the referents of its subexpressions, along with any unarticulated constituents) and the circumstance at which it is evaluated.

\textsuperscript{21} I note in passing that this argument is a distant echo of Davidson’s well-known “semantic innocence” objection (1968: 144). While I have framed it in terms of reference, a similar concern applies to quantification over mental representations, with the proviso that explicit quantification is sometimes replaceable by less expressive language (for example, modal logic corresponds to a fragment of full quantification logic over possible worlds). The language of logical relations between attitude states has been surveyed as a more palatable surrogate for quantification over mental symbols (see Heck 2012, who builds on Taschek 1998: 332).

\textsuperscript{22} See Burge 2010.

\textsuperscript{23} In Lewis’s terms, such agents do not face the coordination problem for which such a convention would count as a solution.

\textsuperscript{24} There remains the possibility that an implicit referential strategy is also implicitly adopted, perhaps by a mental mechanism analogous to a syntactic parser. Discourse Representation Theory (DRT), for example, employs a workspace in which representations of other agents’ cognitive states, including representations of their private symbols, are updated in a quasi-mechanical way by a “construction algorithm,” in the course of interpreting attitude reports (Asher 1986; Kamp 1990). The burden on this sort of approach is to empirically justify the mental structures it posits, including the tendentious representations of other agents’ private symbols, given that these structures are not supported by commonsense reflection on cases involving unsophisticated agents. The basic issue goes back to Grice, and his idea that technical accounts of communicative exchanges should follow the blueprint of our commonsense rational reconstructions (Grice 1957; 1975).
As John MacFarlane (2009) reminds us, context can influence the truth-value of an utterance by selecting the value of a parameter in the circumstance of evaluation. This route bypasses the proposition expressed.

For the most part, Iconodules tread the familiar, referential, path (an exception is Richard 1990). For Crimmins, mental “notions” are part of the propositions asserted and understood by agents who exchange de dicto reports. His Iconodulism is therefore vulnerable to the charge of oversophistication.

For the remainder of this section, I take up the Iconodule world-view, but develop it in a way that stops short of claiming that ordinary agents refer to, or make assertions about, mental symbols. Instead, the truth-value of a report like \( \text{\textbf{Paderewski}} \) depends on the disposition of a mental symbol like \( P_1 \) in virtue of the fact that the mental symbol occupying the position of the name ‘Paderewski’ in the speaker’s internal representation of the report is \textit{de facto coordinated} with \( P_1 \).

Briefly, a state of \textit{de facto} coordination is an equilibrium state in which sets of mental symbols are associated by communicative “conventions” within a group of agents. You can think of this equilibrium state as a distributed context of utterance. Indeed, I will be arguing later that it settles the content of in-group communications, though for the time being I assume the truth-conditional dependency is mediated by a parameter of the circumstance of evaluation, exemplifying MacFarlane’s “non-indexical contextualism.”

I will provide an example of a state of coordination, and then discuss how such a state might be achieved \textit{de facto}. The situation is like the set-up in Loar’s puzzle, discussed earlier. There are two agents, called ‘Speaker’ and ‘Hearer’, and two private representations for each: \( S_1, S_2 \) and \( H_1, H_2 \). As in Loar’s case, all four mental symbols corefer.

The agents hope to develop communicative strategies so that, when Speaker “expresses” \( S_1 \) as some public signal, Hearer will “construe” the signal with \( H_1 \) (and \textit{mutatis mutandis} for \( S_2 \) and \( H_2 \)). They face a coordination problem in Lewis’ (1969) sense. As with choosing a side of the road to drive on, there is more than one way of achieving their joint goal to mutual satisfaction, and each agent’s choice of strategy depends on the choice of the other agent. In fact, the situation fits the narrower category of a \textit{signalling game}, a strategic conundrum in which one agent starts off with information the other lacks. (In the example Lewis uses, of Paul Revere’s plan for warning the countryside by hanging lanterns in the belfry of the Old North Church, only the sexton knows the route of the British troops; in our case, only Sender knows the private symbol he has chosen to express.)

Here’s one effective means (a “signalling system” in Lewis’ parlance) of satisfying the goal above: Speaker expresses \( S_1 \) as ‘Hesperus’ and \( S_2 \) as ‘Phosphorus’, while Hearer interprets ‘Hesperus’ as \( H_1 \) and ‘Phosphorus’ as \( H_2 \). Call this overall strategy profile \( \Sigma \) (see Fig. 1).

One standard way to interpret a signalling game is as a \textit{strategic interaction}, in which an equilibrium like \( \Sigma \), from which neither agent has reason to unilaterally diverge, is arrived at through rational choice based on mutual knowledge of the strategies open to each agent and their payoffs in combination.

\textit{27.} Assuming Speaker and Hearer end up with isomorphic private translations of Speaker’s public utterance (see Stone 2004), this means that \( H_1 \) occurs in Hearer’s representation wherever \( S_1 \) does in Speaker’s.

\textit{28.} The symbol pairs \( S_1, H_1 \) and \( S_2, H_2 \) are the targets of coordination in this case; they are \textit{coordinated on}, in the sense that pairing up those elements with a signalling strategy is the goal of the joint activity of coordination. In a more transparent sense, the object of coordination is a pair of strategies (a strategy profile across the two agents), or an arbitrary equilibrium point.

\textit{29.} Note that the key formal property of a signalling system is injectivity; the strategy profile is a one-to-one mapping from Speaker states to Hearer states.
This interpretation has the defect that it imputes the ability to reason about private mental symbols to our agents ("If Speaker’s strategy is to express \( S_1 \) as ‘Hesperus’, then it is best for me, Hearer, to interpret ‘Hesperus’ as \( H_1 \))."\textsuperscript{30} Fortunately, we can take the very same mathematical structure and interpret it differently. There are ways of taking “strategies” and “payoffs” that place them outside the sphere of rational deliberation. A biological approach, for example, could interpret “strategies” as heritable traits, rather than deliberative options, while indexing “payoffs” to reproductive success.

Here’s a way the agents could arrive at strategy profile \( \Sigma \) without reasoning about mental representation. Suppose Speaker and Hearer falsely believe that two different bodies appear in the sky at particular times and positions (in fact it is the same body appearing twice). Let Speaker represent the body at the first set of coordinates with the symbol \( S_1 \) and the body at the second set with \( S_2 \) (though he is not consciously aware of this; indeed, he has no conception of a mental symbol). Hearer, meanwhile, represents the first body as \( H_1 \) and the second as \( H_2 \).

Suppose the agents not only believe that there are two bodies, but desire a means of talking about each. Speaker would like to be able to indicate that one body, or the other, is visible in the night’s sky. Since he already has a way of conveying the property of being visible, the interlocutors need only coordinate on a pair of public signals to refer to each of the two bodies. By their lights, they face twin problems of referential coordination. It doesn’t particularly matter which public signals they choose, so long as Hearer can tell from the signal which body Speaker is referring to.

After some negotiation, they decide on the following suite of strategies (call it \( \Sigma’ \)): Speaker uses ‘Hesperus’ when he is talking about the first body, and ‘Phosphorus’ when he is talking about the second. Meanwhile, Hearer interprets ‘Hesperus’ as being about the first body, and ‘Phosphorus’ as being about the second. But given how each agent mentally represents these bodies, the effect of deliberate coordination on \( \Sigma’ \) will be \textit{de facto} coordination on \( \Sigma \), the signalling system relating their private symbols. By adopting the policies in \( \Sigma’ \), the agents effectively possess the strategies in \( \Sigma \) – though they never engaged in reasoning about private symbols.

Coordination is \textit{de facto} when it is secured without deliberation over, and perhaps knowledge of, the coordination problem at its characteristic level of description. It may be, as in the case above, a side effect of problem solving at a higher level. The “strategies” so coordinated may be subpersonal mechanisms or agent-level policies beneath conscious access. For instance, an important component of linguistic strategies of communication is the agent’s linguistic competence, or grammar in the Chomskian sense. An agent’s grammar connects utterable signals (e.g. words), via its lexicon, to mental representations,\textsuperscript{31} but is itself opaque to introspective reflection (Chomsky 1986).

We just examined a case in which \textit{de facto} coordination on symbols was the unanticipated result of deliberate referential coordination. Unfortunately, this story doesn’t generalize to all cases of the Loar type. For example, we might adopt a pair of conventions distinguishing “the

\footnote{31. I am simplifying somewhat. For an account of some of the complexities involved, see Stone 2004, 787–89.}
As discussed earlier, de facto coordination can be relevant to the truth conditions, as well as the communicative success, of an utterance. When this occurs, one of the parties is the topic of conversation (and need not be a participant). As discussed earlier, de facto coordination is the basis for an improved Iconodule semantics of attitude reports, one not subject to the charge of oversophistication brought earlier against referential Iconodulism. In sketching this semantics, we first consider a case where the coordinated symbols are immediately related by the underlying strategy profile. We then extend the account to cases where the connection is mediated by other agents. This means that agents who cannot communicate directly with one another may still issue true reports of each other’s cognitive states.

Let’s add to the mix a third agent, called ‘Thinker’. Thinker has two symbols, \( T_1, T_2 \), which she uses to interpret Speaker’s utterances of ‘Hesperus’ and ‘Phosphorus’, respectively. The strategy profile in the signalling game between Speaker and Thinker looks just like \( \Sigma \), except that it coordinates the pairs \( S_1, T_1 \) and \( S_2, T_2 \). If these are standing strategies, then the coordinating conventions persist even when Speaker is not currently talking to Thinker. They form part of the distributed context of Speaker’s conversation with Hearer.

Let’s suppose Speaker, reporting a belief state of Thinker’s to Hearer, employs the name ‘Hesperus’ in the subordinate clause. Against a background including the relevant conventions, this name can be used (when the report is de dicto) to single out Thinker’s symbol \( T_1 \). This is because (i) ‘Hesperus’ here expresses Speaker’s symbol \( S_1 \), and (ii) there is a convention in the context associating \( S_1 \) with \( T_1 \) (and, importantly, none connecting \( S_1 \) with any other symbol of Thinker’s).

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We can extend this idea to a full-dress Iconodule semantics of de dicto reports. I begin with the definitions; discussion will follow. Let \( \text{agent}(.) \) be the function mapping a symbol to its host, and let a strategic path be a sequence of length \( n \) \((n > 1)\), \( \langle x_1, \ldots, x_n \rangle \), such that for every \( i \) \((0 < i < n)\), the strategy profile of \( \text{agent}(x_i) \) and \( \text{agent}(x_{i+1}) \), in the signalling game between those agents, either maps \( x_i \) onto \( x_{i+1} \) or else maps \( x_{i+1} \) onto \( x_i \).

The conventions in context \( C \) de facto coordinate a pair \( x, y \) iff,

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\begin{align*}
&\text{(a)} \quad \text{There is a strategic path between } x \text{ and } y, \\
&\text{(b)} \quad x \text{ is the only symbol in } \text{agent}(x)\text{'s lexicon connected by strategic path to } y, \text{ and} \\
&\text{(c)} \quad y \text{ is the only symbol in } \text{agent}(y)\text{'s lexicon connected by strategic path to } x.
\end{align*}
\]

Finally, an attitude report in context \( C \) is only true if, for each de dicto occurrence of an expression in the report’s scope, the subject of the report represents the associated part of the attributed content with the symbol that is de facto coordinated in \( C \) with the symbol the speaker expresses as that very occurrence.

Hence, in the context of an attribution to Thinker, Speaker expresses \( S_1 \) as ‘Hesperus’, Thinker must mentally represent the planet Venus, in the argument position corresponding to that occupied by the occurrence of ‘Hesperus’, with the symbol coordinated with \( S_1 \) (namely, \( H_1 \)), for that attribution to stand a chance of being true.

How does this account compare to the referential version of Iconodulism? While the de facto coordination account is committed to the Representational Theory of Mind (as every Iconodule account is), it...
avoids commitment to mental representations that refer to other mental representations, and hence to beliefs, plans and goals (tacit or not) that take mental symbols as their concern. For example, the symbol $S_1$ is coordinated with $H_1$ and $T_1$, but refers (like them) to a celestial object. Referential Iconodulism, by contrast, requires many extra symbols to refer to other agent’s symbols. Clearly the same (unambiguous) symbol cannot refer, for instance, to both $T_1$ and the planet Venus.

Note that the public signal used to coordinate a set of mental symbols may change with the context. Particular associations of symbols with signals will come and go in the course of a conversation without affecting the overall pattern of coordination. Suppose it is a temporary convention, one that lapses with the conversational topic, to use ‘David’ to coordinate our symbols for David Kaplan. Once the conversation moves on to a new topical David – David Lewis, say – our symbols for Kaplan might remain coordinated by a fall-back convention to refer to him by the longer form ‘David Kaplan’.

The example we worked through was a “faithful” report. Speaker happened to single out Thinker’s symbol using the same public expression Thinker would use to express it – namely, ‘Hesperus’. De facto coordination is not confined to such cases. Suppose Thinker expresses $T_3$ as ‘Elise’, and Speaker and Hearer interpret Thinker’s utterance ‘Elise’ with $S_3$ and $H_3$. In conversation with each other, however, Speaker expresses $S_3$ as ‘Alice’, and Hearer interprets ‘Alice’ as $H_3$ (they tolerate Thinker’s malapropism, but revert to the correct form in conversation together). In this scenario (see Fig. 2), reporting is not faithful. The expression Speaker uses (in conversation with Hearer) to single out $T_3$ does not match Thinker’s own expression of $T_3$.

We get a sense of the shape of the proposal by examining cases where de facto coordination is ruled out. One sort of case is where the reporter misses a critical distinction. To take a familiar example, suppose Peter has two symbols, $P_1$ and $P_2$, referring to Paderewski, where Speaker has one. In this case, Speaker simply doesn’t have the required number of symbols to line up one-to-one with each of Peter’s.

Figure 2: A case of unfaithful reporting

Note in passing the importance of the relativization of strategies to particular signalling games, between particular players, in the definition of de facto coordination.

Indexicals provide a more run-of-the-mill example of unfaithful de dicto reporting. While Thinker expresses his private symbol for himself in the first person, Speaker and Hearer use the third person to target that symbol in reports about Thinker to each other. Another case with the same structure is where the report is couched in a language unknown to the subject. Suppose Thinker is a monolingual English speaker, while Speaker and Hearer are bilingual in English and French. They might conduct an (unfaithful) discussion of Thinker’s cognitive state in French.

This would be true, for instance, were Speaker unaware that Peter thought there were two Paderewskis. It is plausible that Speaker cannot distinguish the beliefs described in (2) in this case. Referentialist Iconodules would say the same thing of a speaker without mental symbols referring to each of $P_1$ and $P_2$. The question Kripke presses, ‘Does Peter believe that Paderewski is a musician, or not?’, understood as issuing from such an impoverished speaker (and with ‘Paderewski’ occurring de dicto) is unanswerable. It is analogous to the question, ‘Was the inventor of the calculus English or not?’. In both cases, coordination fails due to the multiplicity of candidate targets ($P_1$ and $P_2$; Newton and Leibniz), while the proper answer to the question varies with the candidate. The appropriate response to such a question is not to attempt to answer it, but rather to disabuse its author of the mistaken presupposition. ‘Well, one inventor was, but the other one wasn’t.’

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38. This doesn’t mean that to successfully report Peter’s beliefs, one must first submit to his folly and believe in two Ignacy Jan Paderewskis. Maintaining two Paderewski dossiers is not the same thing as believing there are two
Even if one makes enough distinctions, and hence has a sufficient number of symbols, coordination still fails if the mapping between them is not one-to-one. Suppose Thinker interprets ‘Hesperus’ as $T_1$ and ‘Phosphorus’ as $T_2$, as before, but (pursuing a contrarian policy) expresses $T_2$ as ‘Hesperus’ and $T_1$ as ‘Phosphorus’. It follows that $S_1$ is connected to $T_1$ by the direct Speaker-Thinker route, but also to $T_2$ by the longer Speaker-Hearer-Thinker route (see Fig. 3). It follows that when Speaker utters ‘Hesperus’, expressing $S_1$, a unique Thinker symbol is not singled out.

A many-to-one mapping also rules out coordination, according to our definition. Suppose the goal is to align the Speaker-Hearer pairs $S_1, H_1$ and $S_2, H_2$. A strategy profile that maps both $S_1$ and $S_2$ to $H_1$ would, of course, fail to achieve this end. Still, some argument is required to convince us that the stipulated goal is an appropriate one, Paderewskis – there is no rational bar to maintaining two dossiers while believing that both concern the same individual. Indeed, there is reason to do exactly that if one wants to keep Peter’s beliefs straight.

39. Even if the strategy profile is a coordination equilibrium (i.e. no agent could do better by adjusting the policy of just one agent), the stated goal of coordinating on those pairs of symbols is not met.

Extending Fine’s point, we could say that construing two occurrences of a name (such as ‘Paderewski’) as a case of “representing as the same” when they are not so meant is just as much a failure to understand. A fuller condition on understanding is that we mark coreference in our construal when and only when the speaker is in fact “representing as the same.” In other words, our interpretation must track the speaker’s representations of coreference.

If the mapping from a speaker’s symbols to a hearer’s interpretations is many-to-one, then there are cases where the hearer will repre-
sent as the same what is not marked as such by the speaker’s internal reckoning. There is a corruption of meaning, either in the speaker’s strategies of expression or in the hearer’s policies of interpretation (in the latter case, the hearer marks as the same what was not represented as the same, and so misinterprets the speaker). Only a Lewisian (one-to-one) signalling system, in which all the symbols are coordinated in pairs, would forestall all such corruption.41

A similar argument applies to de dicto reports. If Speaker has two symbols to Thinker’s one, his indirect discourse marks a distinction where there is only unity in Thinker’s mental life. If reference, or de re reporting, were at issue, this wouldn’t be an impediment,42 but the false presumption of a distinction yields indirect discourse with psychological and inferential implications that are likewise false. The question, ‘Does Thinker believe that body is Hesperus or Phosphorus?’, where Thinker doesn’t make the distinction, can only be answered, ‘Neither.’43

41. See Cumming 2013a for the further argument that information (in the mathematical sense) is destroyed on the path from Speaker to Hearer in the many-to-one case.
42. ‘Hesperus’ and ‘Phosphorus’ succeed in referring to Venus, in spite of the fact that there is no distinction in the world corresponding to this distinction in language.
43. By contrast, if someone is pointing at Venus and says ‘Is that Hesperus or Phosphorus?’, it seems reasonable to answer ‘Both’ (though this answer also corrects a false presupposition on the part of the speaker). The false presupposition of distinction may not render every question intuitively unanswerable (see Glanzberg 2005). Where some answer seems intuitive, however, I would argue that it is the response to an implicitly corrected question, as in the exchange, Q: ‘Will the gentleman’s younger son enter the clergy? ’ A: ‘His only male offspring will inherit the estate.’

5. Content

I have now described the character of a case of signaling without mentioning the meaning of the signals. . . . But nothing important seems to have been left unsaid, so what has been said must somehow imply that the signals have their meanings.

In the previous section, I proposed an Iconodule semantics of attitude reports that was not vulnerable to the charge of oversophistication. The semantics relied on a notion of de facto coordination, underwritten by signalling strategies between agents, to connect the private symbol expressed by the speaker to a suitable target in the repertoire of the agent under discussion.

I will now show how this way of defending Iconodulism provides an indirect route back to Fregeanism. To recap, the difference between Fregeans and Iconodules is that the former distinguish cognitive states by some notion of fine-grained shared content, while the latter distinguish them by representational form. The difference evaporates, however, once we notice that the relation of coordination in my Iconodulist proposal also satisfies the formal desiderata of a Fregean same-content relation. It is intersubjective, in the sense that coordinated symbols belong to different agents, and one-to-one (each set of coordinated symbols contains at most one symbol from each agent’s lexicon). The first property characterizes a notion of content that is shared between agents, while the second characterizes a notion that is immune to Frege cases.

To illustrate this, we return to the situation in which Speaker and Hearer have the strategy profile \( \Sigma \) coordinating \( S_1 \) with \( H_1 \) and \( S_2 \)
Figure 4: An assignment of content to $\Sigma$

with $H_2$. As before, all four symbols refer to the planet Venus.\(^{44}\) The agents – who did not realise that two of their dossiers were about the same individual, or who knew this but had some motive to maintain them both – have chosen these communicative policies in the service of a joint goal, perhaps referential coordination. These policies dictate which construal, among coreferring alternatives, is the correct one.

Now consider the hoary principle that communication is successful just in case the content of the hearer’s construal matches the content the speaker aims to express. We gave this up when we became Iconodules. An Iconodule must say that something \textit{more} than a match in shareable content on their account (i.e. reference) is required for communicative success.

We could reaffirm this principle if we were willing to say that coordinated symbols (such as $S_1$ and $H_1$) have the same content, while uncoordinated symbols (such as $S_1$ and $H_2$) do not (see Fig. 4). This distribution of content, along with the above principle connecting content and communication, would capture the coordination-based standard of communication assumed by the Iconodule. It would also, as it happens, yield a notion of content satisfying three Fregean desiderata: intersubjectivity (Speaker symbols share content with Hearer symbols), fine-grainedness ($H_1$ and $H_2$ have the same referent, but different contents), and resistance to Frege cases (only pairs consisting of one Speaker symbol and one Hearer symbol apiece share content, never two Speaker symbols or two Hearer symbols).

As we have already seen, \textit{de facto} coordination extends beyond the immediate confines of the conversation. There is no harm in extending the same-content relation to encompass the coordinated symbols of a third agent, and much to be gained. There is still no risk of a Frege case (we do not exceed the strict limit of one symbol per agent per content), and we can reinstate the Fregean semantics of ascription on which attitude states are distinguished by their content alone.

Since Speaker’s symbol $S_1$ is coordinated with Thinker’s symbol $T_1$, they both have the same content, call it $\kappa_1$. The semantic value of an utterance expressing a symbol $x$ is the content of $x$. Hence, Speaker’s utterance of ‘Hesperus’, expressing $S_1$, has semantic value $\kappa_1$. If the utterance occurs in the scope of an attitude report, then it contributes $\kappa_1$ to the content ascribed in the report. Finally, if Thinker is the subject of that report, then its truth-value will depend on the disposition of $T_1$, since that is the only symbol in Thinker’s lexicon to have $\kappa_1$ as its content. By following the truth-conditional recipe enshrined in the Fregean picture, we arrive at the same prediction as the Iconodule semantics based on \textit{de facto} coordination.

On this version of the Fregean picture, symbols $x, y$ have the same content ($x \approx y$)\(^{45}\) iff either

\begin{align*}
(4) & \\
& a. & x = y, \\
& b. & x \text{ is } \textit{de facto} \text{ coordinated with } y \text{ (see (3))}.
\end{align*}

\(^{44}\) For the purposes of this paper, I take reference to be primitive. In Cumming 2013a, I argue that a related definition of content satisfies the Fregean condition that content determines reference (i.e. if two symbols have the same content, they also have the same reference if they refer at all).

\(^{45}\) This claim is implicitly relativized to a time, since communicative strategies, and the coordinative superstructure, can change. This limits the present version of the theory to synchronic claims. For suggestions concerning a diachronic generalization see Cumming 2013a.
This relation, as we require of any same-content candidate, is reflexive, symmetric and transitive.\textsuperscript{46} It therefore partitions the set of mental symbols into cells. Moreover, the partition so described is orthogonal to the partition of mental symbols into agent lexicons (meaning that any cell in the first partition will intersect on at most one element with any cell from the second). The first property ensures that we can assign an entity – a content – to each cell. The second property rules out Frege cases, or pairs of representationally distinct but semantically equivalent cognitive states of one agent.

Two morals may be drawn. The first is that not every account of intersubjective content is susceptible to counterexample in the form of a Frege case. More work needs to be done to establish the empirical correctness of the definition in (4).\textsuperscript{47} but I have at least demonstrated its equivalence to the best version of a promising rival (namely, Iconodulism based on de facto coordination).

The second moral consists in the formal analogy between coordination and content, from which it follows that every Iconodule semantics based on a coordinative relation possesses a Fregean reformulation. There is a certain justice to this result, as I consider both perspectives (Iconodulist and Fregean) on communication and reporting equally worthy.\textsuperscript{48}

The representational perspective of Iconodulism is necessary for developing the analogy, mentioned earlier in a footnote, between the de re/de dicto and indefinite/definite distinctions (and thus further elaborating the relationship between reporting and communication). The use of a definite noun phrase (a name, pronoun, demonstrative or definite description) enjoins coordination on a pair of “familiar”\textsuperscript{49} dossiers, while the use of an indefinite signals that the speaker is not trying to coordinate with the hearer. The appropriate response to an indefinite is for the hearer to begin a new dossier, not re-open an old one (Karttunen 1976, Heim 1982, Kamp & Reyle 1993).

While no change in linguistic form marks the de re use of an expression,\textsuperscript{50} the protocol is similar, in that the requirement of coordination – in this case, on a dossier belonging to the report’s subject – is relaxed. Accordingly, the de re use has similar applications to its indefinite counterpart. Suppose Endicott has two internal representations of Venus. I might want to tell you what he thinks about the planet without committing to a particular choice among them. Perhaps I don’t know which dossier the belief is stored in,\textsuperscript{51} or maybe I’m just being coy.\textsuperscript{52} Either way, to understand me, you must grasp my intent to use the expression de re, and not take me to be committing myself to a claim about a particular dossier.

One who adopts the Fregean – rather than the Iconodulist – perspective is, by contrast, motivated to investigate the nature of the se-

\textsuperscript{46} Transitivity is the only property that is not immediately obvious. Suppose $x \approx y$ and $y \approx z$. It follows that, unless $x = z$ (in which case $x \approx z$ is immediate), there is a strategic path from $x$ to $z$ (via $y$). Assume for reductio that there is a symbol $x' \neq x$ in agent(x)’s lexicon connected by a strategic path to $z$. But then $x'$ is also connected to $y$ (via $z$), contradicting $x \approx y$. Likewise, assume for reductio that there is a symbol $z' \neq z$ in agent(z)’s lexicon connected by a strategic path to $x$. But if that were so, $z'$ would be connected to $y$ (via $x$), contradicting $y \approx z$.

\textsuperscript{47} Elsewhere (Cumming 2013a), I make the empirical case for a related account of content. I discuss psycholinguistic data that supports the existence of de facto coordination at different levels of human interaction, as well as linguistic accounts of the mechanisms that would produce such coordination. For good measure, I also defend the account against a modal objection to which Devitt’s (1981) causal-historical account of content is susceptible.

\textsuperscript{48} See Pinillos 2009: 314 for a different verdict.

\textsuperscript{49} The relevant sense of “familiarity” includes dossiers for individuals that can be inferred to exist on the basis of knowledge the agent already possesses and/or given certain reasonable assumptions – for instance, that cars have engines, or that the speaker has a maiden aunt (see Hobbs et. al. 1993).

\textsuperscript{50} As there is no marking of definiteness in many of the world’s languages (Lyons 1999).

\textsuperscript{51} An analogous case with an indefinite:

(i) Alice and Berys came to tea. One of them, I don’t know which, brought cake.

\textsuperscript{52} An analogous case here would be:

(i) I’m thinking of a number between 1 and 10.
semantic category circumscribed by the coordination relation. In a different paper, I develop the view that contents are discretized units of information (in the mathematical sense). This view follows from the account in (4), once it is noted that strategically connected strata in a Lewisian signalling system are informationally equivalent (see, for instance, Skyrms 2010).

The path back to Fregean content from de facto coordination has revealed the flaw in the quite natural thought that, whatever semantic object one adopts as one’s unit of content, the same person might have different “takes” on that object, leading to a Frege case for the relevant notion of content. The tempting generalization ignores a class of candidates for content – including information – whose constitutive connection to underlying one-one relations rules this possibility out. If the tempting thought could be precisely argued, then we would be forced to conclude that only notions of content with such a relational basis stand a chance of verifying the Fregean picture.

References


From Coordination to Content

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